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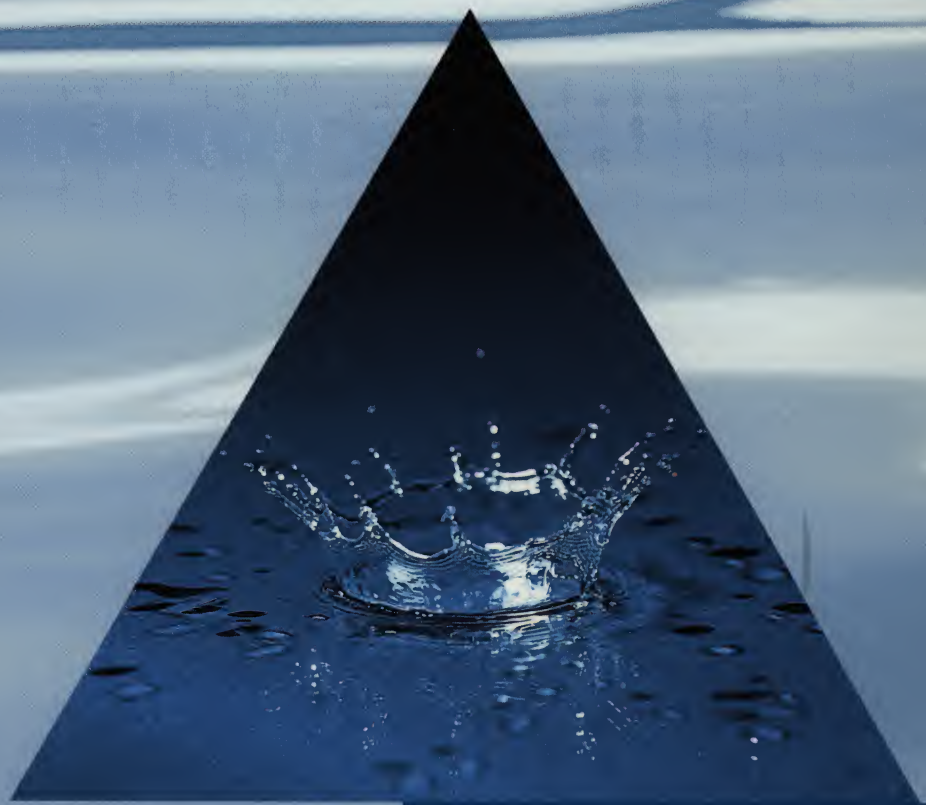
WRQ Reflection Network Series®



User Guide ▲ D O S

▼ **NFS Option**
Version 2.1
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WRQ Reflection Network Series®

User Guide ▲ D O S

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Reflection Network Series NFS Option *User Guide*
Version 2.1
February 1995

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SECTION 1

Introducing the NFS Option

NFS, or network file system, is a system that runs over a TCP/IP stack and provides transparent remote access to shared files. NFS also lets you link, or *mount*, remote volumes, print to remote devices, and perform other remote operations. NFS was introduced by Sun Microsystems in the mid-1980s, and Sun issued the protocol specification in a Request For Comments in 1989 (see RFC 1094).

The Reflection Network Series NFS Option is WRQ's NFS implementation. It lets you share the resources and information on your Ethernet or Token Ring local area network. From the DOS prompt or from Microsoft Windows, you can:

- Share network printers
- Transfer files stored on network servers using DOS commands, even if they were created using a different operating system
- Run programs on your PC that are stored on a network server

With the NFS Option and with NFS software running on the host or hosts, the file and print servers on your local area network appear as local drives and printers. DOS and UNIX host file naming and storing differs, however; see page 27 for a description of the differences and how the NFS Option handles them.

The NFS Option commands can be divided into these groups:

Network Commands	To mount a host file system on a local DOS drive, validate a user on a host, unmount all remote drives, set default file protection codes, remove remote binding, and remove all record and file locks on a particular host.
File Manipulation	To change the protection codes on your files, convert files from DOS to UNIX, or from UNIX to DOS, and display file information.
Getting Information	To display information about mounted drives, report which file directories are available for mounting, show mounted drives, display disk quotas, show values in a *Yellow Pages* map, and show the value for a keyword in Yellow Pages.
Printing Commands	To send an initialization string that specifies a printer type to a printer that can emulate several different types.
Remote Commands	To execute a non-interactive command on a remote system, when either a password or no password is required.

The section called "Reflection Network Series NFS Commands" contains a detailed description of the commands used to perform the above functions; see page 51.

CHAPTER 1

Installing the NFS Option

The NFS Option runs in conjunction with the Reflection Network Series software. This chapter lists the software requirements for running the NFS Option, and explains how to install the software.

Requirements

The following software is required on the PC for running the NFS Option:

- PC or MS-DOS Version 5.0 or higher.
- One of the following products in the Reflection Network Series for DOS, version 2.1 or higher:

  3000 Connection
  TCP Connection
  NS Connection

  This software must be installed before you install the NFS Option.
- If you plan to use Microsoft Windows, make sure it is version 3.1 or higher, and that you are running in enhanced mode (not real or standard modes).

In addition, the following NFS software (typically provided by your host software vendor) is required on the server to work with the NFS Option on the PC:

NFS
LOCKD (required only if you use file locking and sharing)
MOUNTD
PORT MAPPER
PCNFSD version 1

With the exception of PCNFSD, each server to which you want to gain access must have the above programs running; PCNFSD typically needs to be on only one network server (PCNFSD is explained further on page 21). The NFS Option requires PCNFSD version 1; if you already have PCNFSD version 2 on your server, you can run both versions without any problem.

After installing and loading the NFS Option on your PC, you can use the RPCINFO command to determine if the above programs are running on the server; see page 73 for details about this command.

Running Setup

The NFS Option software includes a Setup program, which does the following:

- Creates a directory for the NFS Option, if necessary.
- Copies all the NFS Option files to that directory.
- Modifies NET.CFG or PROTOCOL.INI, adding keywords or changing their settings; see page 15 for a list of the valid keywords and settings.
- Optionally modifies your CONFIG.SYS and AUTOEXEC.BAT files, to contain information required by the NFS Option.
- Optionally modifies your STARTNET.BAT file, which loads the Reflection Network Series software, to also load the NFS Option software.

  If you choose to make this change, your STOPNET.BAT file is also modified to unload the NFS Option when you unload your other Reflection Network Series software.
- If you're running Microsoft Windows:
  - Adds WRQNFS.DRV and VWRQNFS.386 to SYSTEM.INI so that the NFS Option can be used in Windows as well as DOS; see page 31.
  - Creates a WRQNFS.INI file in your Windows directory to store the NFS Option settings used in Windows; see page 32.

Note: Some network software may prevent the NFS Option Setup program from modifying the system files it needs to. If you have trouble running Setup and are using Novell NetWare version 4.0 or later (or another network operating system), try unloading your network software, then re-run Setup. ▲

To install the NFS Option on your local hard drive:

1. Insert the NFS Option disk and type `A:SETUP` (or `B:SETUP`) and press Enter ↵.
2. Select "Install the NFS Option" from the NFS Option Setup menu and follow the on-screen instructions. The default installation directory for the NFS Option is \WRQNET.
3. After the Setup program copies all of the files to your NFS directory, it asks for the location of your Reflection Network Series software. The default directory is \WRQNET. Change the directory information if necessary, then press Enter ↵ to proceed.
4. The next screen asks for the location of your NET.CFG or PROTOCOL.INI file (the Reflection Network Series configuration file). The default directory is \WRQNET. Change the directory information if necessary, then press Enter ↵ to proceed.

   If Setup finds both a NET.CFG *and* a PROTOCOL.INI file in the specified directory, you're asked which one you want to modify. Enter "O" to modify NET.CFG, which is used for an ODI installation of the Reflection Network Series; enter "N" to modify PROTOCOL.INI, which is used for an NDIS installation of the Reflection Network Series. (It's possible to have both files if at one time you had an NDIS installation, then you upgraded to version 2.1 or higher of the Reflection Network Series and installed the ODI drivers instead.)

5. Next, the "Basic Configuration" screen appears:

```
                    Basic Configuration

User name
Time zone                   8 Hours        WEST
Path to Windows             C:\WINDOWS
Load from STARTNET.BAT      Y
Last drive                  I
Accept values

Advanced configuration menu
```

Most users should need only the Basic Configuration screen. If you want to set advanced NFS options, select "Advanced configuration menu." Most advanced options have equivalent keywords in NET.CFG or PROTOCOL.INI; the next chapter explains these options in detail. Until you select "Accept values" on the Basic Configuration screen, you can switch between the basic and advanced configuration screens as much as you like.

On the Basic Configuration screen, the "Last drive" parameter sets the last DOS drive letter that will be available as an NFS drive. (It does this by adding a LASTDRIVE statement to your CONFIG.SYS file.) Drive letters between your PC's actual last drive (usually a hard drive C:) and this setting are then available for NFS.

If you will be running the NFS Option concurrently with Novell's NetWare, the NetWare drive assignments begin *after* the "Last drive" setting, and the NFS assignments precede and include that setting.*

For example, if your hard drive is C: and your first NetWare drive is K:, specifying a last drive of *J* allows remote drives D: through J: to be NFS drives, while drives K: and up will be Novell drives (assuming nothing else is using those drives, like a CD-ROM device). The NFS Option Setup program offers to set the last drive to something that will allow NetWare and NFS to co-exist.

* If you are running NetWare without packet drivers, just edit your CONFIG.SYS file after Setup is done, and set the LASTDRIVE parameter to one less then your first NetWare drive.

If you use Microsoft Windows for Workgroups and log on to a workgroup (rather than a domain), the first three drive letters after your PC's last drive letter are reserved by Windows for Workgroups. When using the NFS Option in this environment, drive assignments starting four letters after your last PC drive up to and including the last drive setting are available as NFS drives. For example, if your hard drive is C: and you specify a last drive of *I*, D:–F: will be reserved by Windows for Workgroups, making G:, H:, and I: available as NFS drives. See page 45 for more information about using the NFS Option with Windows for Workgroups.

6. Once you're satisfied with the values shown, choose "Accept values."

   Setup then checks and modifies (if requested) your system files, updating them for the NFS Option.

If you chose to have Setup make changes automatically, all changed files are backed up to file names that consist of the original name and an extension that is the first unused number in a series that starts with "000". In addition, Setup adds the directory to which NFS was installed to the PATH variable in your AUTOEXEC.BAT file. If you did not already have a PATH, one is added for you.

If you chose to *not* make changes automatically, your system files are copied and the copies are modified and given the extension "WRQ".

The Setup program itself is copied to your local hard drive as SETUPNFS.EXE (to distinguish it from other setup programs). You can re-run it to make changes to your NFS configuration.

After Setup is done, reboot your PC so that the changes you made during Setup take effect.

Loading the NFS Option Software

As with the other components in the Reflection Network Series, you load the NFS Option software from DOS, whether you plan to use NFS services from DOS or Windows.

If you told the Setup program to load the NFS Option from your STARTNET.BAT file (as shown in the Setup screen pictured in the section above), the NFS software is loaded when you run STARTNET.BAT to load your other Reflection Network Series software components. If STARTNET.BAT runs from your AUTOEXEC.BAT file, the NFS Option is loaded when you reboot your PC.

If you did *not* choose to load the NFS Option from your STARTNET.BAT file, you can load the NFS software by running the WRQNFS.EXE program from the DOS prompt: type `WRQNFS` at the DOS prompt and press Enter ↵.

You must load your other Reflection Network Series software (specifically, the WRQTCP.EXE program) before you can load the NFS Option.

Once the NFS Option is loaded, you can mount remote file systems, print to remote printers, and perform other remote operations. These procedures are explained in the following chapters. To use two of the NFS Option commands—REXEC and RSH—you must also load the WRQHPSO.EXE program that's included with the Reflection Network Series software; REXEC and RSH are explained starting on page 72.

There are also optional parameters you can specify when loading WRQNFS.EXE to set the number of file buffers for the NFS Option, set a timeout value, or perform certain types of file locking. See page 13 for details about these parameters.

LAN Manager and Other Microsoft Networks

The NFS Option can run concurrently with other Microsoft compatible networks, including LAN Manager and 3Plus. To allow multiple network operating systems, both network packages must support the packet driver, ODI, or NDIS specification.

Since many of these networks also include their own NET command, rename the NFS Option's NET.EXE program to NFS.EXE and then use the NET command as follows: `NFS LINK`.

For proper operation of both networks, WRQNFS must be loaded after the other network software has been loaded and started. The NFS Option may not run if other networking software is loaded after it.

CHAPTER 2

Configuring the NFS Option

The NFS Option, like other Reflection Network Series products, can be configured using a series of keywords in an ASCII file (NET.CFG or PROTOCOL.INI) that is created or modified when you run the Setup program. The WRQNFS.EXE program accepts the following parameters:

```
WRQNFS /? /B /F:<# of buffers> /T /U /V
```

`/?` Displays a usage message for WRQNFS.EXE.

`/B` Type `WRQNFS /B` if you use an application that must synchronize access to a server file that is larger than 16 Mbytes. This parameter changes the way that file locks are implemented so that OLE 2.0 can work with NFS. You should *not* use the /B parameter if you run applications that use OLE 2.0, such as Microsoft Word for Windows, Excel, and others.

`/F:<# of buffers>`

Type `WRQNFS /F:<# of buffers>` if you need to specify more file buffers than the default of *16*. This parameter is needed only if you use the NFS Option with Microsoft Windows, and only if you run a server-based application that opens a lot of files at once (Lotus 1-2-3 is such an application; you should specify at least *16* buffers). You may also need to increase this value if you have trouble copying large groups of files in File Manager. The range of values for this parameter is *4–80*. Each file buffer requires 300 bytes of memory. This parameter has no effect on the `NumTCPBuffers` keyword described on page 19.

/T:<timeout>

Type WRQNFS /T:<timeout> to change the amount of time the NFS Option waits for a response from the host before timing out. The *<timeout>* value is specified in tenths of a second; for example, a value of *20* indicates a timeout of two seconds. You may need to specify a higher timeout than the default of *4* if your host is slow to respond to NFS requests (when using the NET or EXPORTS commands, for instance) and you receive a read or write error while accessing an NFS drive. Timeouts may be more likely to occur when linking NFS file systems on HP 3000 hosts; for example, when linking to an HP 3000 running NFS/XL from Quest Software, Inc. The range of values for this parameter is *2–250* tenths of a second.

/U Type WRQNFS /U (unload) to remove the NFS Option from memory. This uninstalls the NFS Option, as long as no drives are currently linked and no other memory-resident programs have been loaded after WRQNFS.EXE.

/V Displays the version of WRQNFS.EXE currently loaded in memory.

Configuring the NFS Option with NET.CFG or PROTOCOL.INI

NET.CFG is used to configure ODI-compliant modules, and PROTOCOL.INI is used to configure NDIS-compliant modules. All Reflection Network Series for DOS products except the Telnet Connection make use of one or the other of these files.

NET.CFG contains section headings and any options that deviate from the established defaults. It is formatted as follows:

- The NET.CFG file is left-justified for main section headings and other entries are indented (with either spaces or a tab) under each heading.
- The heading must precede the options you want to include in that section. End each line with a hard return. Write all numbers in decimal notation except where noted otherwise. Precede comments by a pound (#) sign.
- Keywords and main headings are not case sensitive.
- When specifying an IP address, use spaces as separators, as in 192 90 5 2.

PROTOCOL.INI is similar:

- The keywords are not case sensitive.
- The full string must be used; no abbreviations are recognized.
- If a value is needed and it is not listed, the default is assumed. All entries must include an equals sign (=). The equals sign should be after the keyword even if no value is associated with the keyword, for example:

```
NumNFSRedirects =
```

- When specifying an IP address, use spaces as separators (PROTMAN.DOS will not load if you use periods); for example: `192 90 5 2`.

Keyword Summary: NET.CFG and PROTOCOL.INI

This section describes all of the possible settings for the NFS Option section in NET.CFG (for an ODI environment) and PROTOCOL.INI (for an NDIS environment). In NET.CFG, the keywords appear under the heading `Protocol TCP2PDIS`, and in PROTOCOL.INI, they appear under `[WRQNDIS1]`. Most of these options can be set using the Advanced Configuration screen of the NFS Option Setup program.

FileModeMask

Not all of the file permissions or privileges that are possible in the UNIX operating system have an equivalent in DOS. When you use the NFS Option to move a DOS file to UNIX, the `FileModeMask` keyword sets UNIX file permissions using a three-digit octal number that is any combination of the following values:

`001`	Execute/search by others	`040`	Read by group
`002`	Write by others	`100`	Execute by owner
`004`	Read by others	`200`	Write by owner
`010`	Execute/search by group	`400`	Read by owner
`020`	Write by group		

To allow full access by the file owner (you), but only read and execute by group and others, for example, use `FileModeMask = 755`.

Values: *0–777*
771 (default)

The default value of *771* gives read, write, and execute permissions to the file owner; read, write, and execute permissions to group; and execute permission to others. This is the recommended setting for this parameter.

NFSFileCacheSz

The NFS Option maps UNIX file names into a format that DOS can understand (no more than 8 characters in the file name, and no more than 3 characters in the extension) so that DOS and UNIX files can be moved freely between nodes on the network (see page 27).

The NFS Option sets aside a portion of RAM to hold this table of UNIX file names and the corresponding (mapped) DOS file names. Use `NFSFileCacheSz` to configure the number of entries in this table.

Values: *0–32*
32 (default)

NFSHostFlNameSz

The NFS Option maps host file names into a format that DOS can understand so that files can be moved freely between nodes on the network. Use `NFSHostFlNameSz` to configure the maximum host file name size. If, for instance, you are using the host simply to store DOS files, this setting need only be *12*, which accommodates the largest allowed DOS file name size (an 8-character name, a period, and a 3-character extension). Be aware that UNIX file names can be up to 255 characters long, however (though they rarely exceed 32 characters).

Values: *12–255* (bytes)
32 (default)

NFSReadSize

This is the size of an NFS read operation—the number of bytes transferred in one read request. For greatest efficiency, it should be a multiple of 512 bytes. The read size should not exceed the incoming buffer size of your specific network adapter card; if it does, you may have trouble copying files from an NFS server, and you should try lowering the value for this parameter. On slower-speed networks or hosts, or through gateways, a lower read size may provide better results.

Values: *512–8192*
4096 (default)

Recommended sizes for some popular adapters are:

3C501	*1024*
3C503	*4096* (default)
WD8003	*4096* (default)
WD8003EA	*8192* (Micro Channel only)

The default read size can be overridden with the /r:<n> parameter of the NET LINK command, described on page 66. The read size is also minimized with the host's "request transfer size."

NFSWriteSize

This is the size of an NFS Option write operation—the number of bytes transferred in one write request. For efficiency, it should be a multiple of 512 bytes. The write size should not exceed the outgoing buffer size of your specific network adapter card; if it does, you may have trouble copying files to an NFS server, and you should try lowering the value for this parameter. On slower-speed networks or hosts, or through gateways, a lower write size may provide better results.

Values: *512–8192*
4096 (default)

The default write size can be overridden with the /w:<n> parameter of the NET LINK command, described on page 66. The write size is also minimized with the host's "request transfer size."

NISDomainName

NIS is a network database for information about resources on the network—host names, IP addresses, Ethernet addresses, and so on. The portion of the network about which a database has information is called its *domain*. For example, if a host has the fully-qualified name of midway.circus.com, its domain would be circus.com.

To use the NIS facility, you must specify the name and IP address of the PC's NIS server. For example, in a NET.CFG file, these entries might look like this:

```
NISDomainName  haddock.edu
NISIPAddress  192 90 5 2
```

Note: If you have used Beame & Whiteside's software or LAN Workplace for DOS, you may have a `YPDOMAIN=` environment variable set in your AUTOEXEC.BAT file to perform a function similar to that of two keywords shown above. The NFS Option ignores this environment variable, and you must use the NFS Option keywords instead. ▲

Value: *<string>*

NISIPAddress

The IP address of the NIS (Yellow Pages) server. This must be supplied if you plan to use NIS. See the above description of `NISDomainName` for more information.

Value: *<IP address>*

NumNFSRedirects

Use this keyword to set the maximum number of links that are allowed at any one time by the NFS Option. Both disk drives and physical devices (for example, PRN:, COM1:, etc.) can be redirected and each such redirection requires one link.

Values: *2–25*
6 (default)

NumTCPBuffers

This keyword is also part of the Reflection Network Series Setup. It determines the total number of TCP buffers for all circuits. Smaller numbers conserve memory, larger numbers may improve performance. The default setting during the Setup for the Reflection Network Series is *5*; the NFS Option Setup changes this setting to at least *10* (if your setting is already *10* or higher, it is left unchanged when you run the NFS Option Setup program). This keyword is unrelated to the /F (files) parameter you can use when starting WRQNFS; see page 13 for details.

Values: *2–16*
10 (default)

TCPBufferSize

This keyword is also part of the Reflection Network Series Setup. It determines the size of the data buffers used by TCP/IP, in bytes. The default setting during the Setup for the Reflection Network Series is *1090*; this is also the minimum setting for the NFS Option. If your setting is already *1090* or higher, it is left unchanged when you run the NFS Option Setup program.

Values: *586–1526*
1090 (default)

TimeZoneMinutes

The number of minutes you are away from universal time (Greenwich Mean Time, or GMT). This parameter is set when you run Setup and indicate what time zone you are in.

To calculate this value, subtract the number of minutes you are west of GMT from 1440. For example, if you are 6 hours west of GMT, this parameter becomes 1080 (1440 - 6 hours × 60 minutes). If you are 2 hours east of GMT, you are 22 hours west of GMT for purposes of this parameter, which becomes 120 (1440 - 22 hours × 60 minutes). If your time zone is the same as GMT, you can use either 0 or 1440 for this parameter.

Values: *0–1440* (minutes)
960 (default: Pacific Standard Time)

Memory Management

For normal operation, the NFS Option needs some internal buffer space for incoming packets, file buffering, directory services, and IP fragmentation reassembly. You can optimize memory usage with one or more of the following methods:

- Configure the memory in your PC. All of the settings for the NFS Option are stored in WRQTCP.EXE, which is the TCP/IP layer of the Reflection Network Series. Both this TSR (terminate and stay resident) program and WRQNFS.EXE can be "loaded high," as long as enough PC memory is available. See your Reflection Network Series documentation for more details on using memory management programs.
- Change the settings in NET.CFG or PROTOCOL.INI for the keywords `NumTCPBuffers`, `NFSReadSize` and `NFSWriteSize`. The size of the NFS read and write buffers can also be set with parameters of the NET LINK command (see page 65).
- Use the /F parameter when running WRQNFS.EXE. This specifies the number of buffers that server-based Windows applications can use for opening simultaneous files. Each additional file buffer requires 300 bytes of memory. See page 13 for more information about this parameter.

CHAPTER 3

Linking Remote File Systems and Printers

One of the primary services that the NFS Option provides is the ability to link, or *mount*, remote file systems and printers. When you link a remote file system or printer, you associate that system with a DOS drive letter or print device. This makes the system accessible from your PC as if it were another DOS device. You can then use familiar DOS and Windows commands for access to resources on the remote system.

For example, if your PC's hard drive is C:, you can use the NFS Option to create a "logical" disk drive D:, and link it to a UNIX file system. When you change to drive D: on your PC, you gain access to files on the UNIX host.

You use the NET LOGIN command to log in to the NFS server, the EXPORTS command to determine which remote file systems are available, and the NET LINK command to link remote file systems and printers.

If you use the NFS Option with Windows, you can link remote systems either from DOS or from within Windows. Using the NFS Option with Windows is explained in detail on page 31.

User Authentication

The NFS Option uses a special program called a dæmon on one of your NFS servers to *authenticate* PC-based NFS clients (such as the NFS Option) and their users and to provide support for printing. Authentication is a form of security in which the dæmon validates the user name and password before access is granted to the NFS server.

Most NFS servers use the PCNFSD dæmon to provide authentication services, and the NFS Option supports this dæmon. The NFS Option requires PCNFSD version 1; if you already have PCNFSD version 2 on your server, you can run both versions without any problem. To determine if PCNFSD is available, and to determine its version, use the RPCINFO command; see page 73.

Before you link a remote file system or printer, you can use the NET LOGIN command to authenticate your user name and password on the NFS server. Once you are authenticated, you can link file systems and printers without providing a user name and password for each new link command; authentication on one NFS server typically grants you access to all NFS servers on the same network.

To perform authentication:

1. At the DOS prompt, type `NET LOGIN` and press Enter ↵.
2. At the "Authentication Server" prompt, type the name of the NFS server that provides your authentication service and press Enter ↵.
3. At the "Username" prompt, type your user name and press Enter ↵. Since most NFS servers are UNIX hosts, the user name is typically case sensitive.
4. At the "Password" prompt, type your password and press Enter ↵. Since most NFS servers are UNIX hosts, the password is typically case sensitive.

   When you type your password, it appears on the screen as dashes to keep your password secure.

If authentication succeeds, a message similar to the following is displayed:

```
Logged on as user "samf".
```

If you plan to use the NFS Option in Windows, performing the above procedure from DOS retains your user authentication once you enter Windows. You can also login from within Windows, using the procedure on page 36.

If you do not obtain authentication using the NET LOGIN command, you can still link file systems and printers, but you must provide your user name and password for each link you perform. In this situation, authentication is performed on the NFS server to which you are linking (and the server must therefore have a PCNFSD dæmon available).

In some cases, you *must* perform authentication by using the NET LOGIN command before you can link file systems and printers. For example, if only one of your NFS servers is running the PCNFSD dæmon, you must be authenticated by this server before you can link to file systems on other servers.

If a server does not have a PCNFSD dæmon when you attempt to obtain authentication or link a file system or printer, the operation fails and you receive an error message.

Determining the Available File Systems

To determine which file systems (or paths) on a host can be linked as drives on your PC, use the EXPORTS command. The output from this command shows which file systems the NFS server is exporting, and to which users. It also shows the syntax for specifying a file system.

For example, if you want to determine the file systems that can be linked on an NFS server called "circus," use the following command:

```
exports circus
```

The output is as follows:

```
Export list for circus
/    (everyone)
/tmp (everyone)
```

It sometimes takes a little while for the EXPORTS command to collect the data for the export list. The response from the server (in this case, circus) is fastest if the server name is in your HOSTS file.

In this example, the file systems `/` and `/tmp` on circus are available for linking. The next section explains how to link a remote file system.

Linking a Remote File System

To link a remote file system to a PC drive letter, use the NET LINK command. The PC drive letters that will be available for linking are determined by the LASTDRIVE statement in your CONFIG.SYS file (see page 8 for more information).

To determine which remote file systems are available for linking, use the EXPORTS command, as described above. The output from the EXPORTS command also shows the syntax of the host path name as you must enter it with the NET LINK command. Whereas DOS path names use the backslash (\) character to separate directories, NFS servers (which typically use UNIX naming conventions) usually separate directories with the forward slash (/) character.

For example, assuming that authentication has already been performed with a NET LOGIN command, a user could enter the following command to assign the drive letter F: to the /tmp file system on the host called circus from the previous section (the host circus should be in your HOSTS file; if not, replace the host name in this command with its IP address):

```
NET LINK F: \\circus\/tmp
```

This command links the /tmp file system on circus to drive letter F: on your PC. When you change to the F: drive, you gain access to files and other resources in the /tmp directory on the host circus.

If authentication was not already performed with a NET LOGIN command, the user with login name MHS could use this form of the NET LINK command to accomplish the same task:

```
NET LINK F: \\circus\/tmp MHS mypass
```

This allows the user MHS to link the remote file system on circus, but it does not authenticate MHS for subsequent logins. Either the NET LOGIN command must be used, or a user name and password must be specified for each NET LINK command.

When the password `mypass` is entered in the above command, the password appears on the screen. If you want to keep your password secure, omit it from the NET LINK command. You're then prompted for your password; when you type your password at the prompt, your password does *not* appear on screen.

The complete syntax of the NET LINK command is described on page 65.

Compatibility with Sun Microsystem's PC-NFS Syntax

For users familiar with Sun Microsystem's PC-NFS product, WRQ's NFS Option provides an alternate form of the NET LINK command. The NET USE command provides the same functionality as NET LINK, but with a command syntax similar to Sun's.

For example, to perform the same file system link in the example above, you could issue this NET USE command:

```
NET USE F: circus:/tmp
```

The NET USE command also provides additional functions. See page 70 for complete information about this command.

Linking a Remote Printer

In addition to linking remote file systems, you can use the NET LINK command to connect to a print queue on an NFS server. Once linked, you can direct output from DOS or Windows to the remote printer.

For example, if a printer is available on the host called "bigtop," you could link to it using the following command (assuming user authentication was already performed with a NET LOGIN command):

```
NET LINK LPT1: \\bigtop\lp
```

This command links the DOS print device called LPT1: to the remote printer called lp on bigtop. Whenever output from your PC is directed to the LPT1: device, it is printed on the printer connected to bigtop.

You can also use the NET USE command to link printers. Using the same printer as in the example above, the NET USE command would be:

```
NET USE LPT1: bigtop:lp
```

PC devices to which you can link printers typically include the communications ports COM1, COM2, COM3, COM4, and the printer ports PRN, LPT1, LPT2, LPT3, and LPT4. If a device is currently in use by another program, such as a communications program or a print device, you must first disconnect the device before you can link it for use by the NFS Option.

Likewise, if you're on a local area network and the network software automatically maps remote printers to local PC devices, you will need to unmap the remote device before you can link it for use by NFS. When you're done using a remote file system or printer, you can unlink it and make your DOS drive letter or device available for a new link.

To unlink either a file system or printer, you use the NET UNLINK command. For example, to unlink the remote file system linked to your PC drive letter D:, you would use this command:

```
NET UNLINK D:
```

To unlink a remote printer linked to the DOS device LPT1:, you would use this command:

```
NET UNLINK LPT1:
```

After the device is unlinked, the message "Device <name> unlinked" is displayed.

If you used the NET LOGIN command to perform authentication, unlinking a device does not log you out of the network; you must use the NET LOGOUT command, described in the next section, to log out. If you did not use the NET LOGIN command, but instead specified a user name and password when you linked a device with the NET LINK command, your login is removed when you unlink the device.

Logging Out

When you're done working with remote file systems and printers, you can log out of the network. This helps maintain security and protect your files by preventing other users from using your PC to gain access to network services.

To log out of the network, type `NET LOGOUT` at the DOS prompt, then press Enter ↵.

When you log out of the network, *all* of your NFS drives and printers are unlinked.

File System Differences

The NFS Option lets you move files freely between different file systems; for example, between DOS and UNIX or between DOS and MPE on a Hewlett-Packard minicomputer, as long as the host file system is running an NFS server.

But these systems do not have the same rules for naming files, storing them, or for determining to what extent they can be shared with or kept from other users. This section describes how the NFS Option handles these differences.

File Name Mapping

The DOS operating system limits file names to eight characters and a three-character extension: `12345678.123`. This is also simply called 8.3.

In copying a file to DOS from a different file system, the file name is converted by making all of its characters uppercase and using the 8.3 scheme. If, during the conversion, there are no uppercase or invalid characters encountered and the name fits into that scheme, it is left alone. If any problems occur in the conversion (for instance, invalid characters, characters that exceed the 8.3 boundaries, and so on), invalid characters are replaced with the "^" character and a unique sequence of characters, also called a *cookie*, is placed at the end of the name.

The cookie is preceded by a tilde ("~"). Thus, the UNIX file called ".login" may be converted to the DOS file name "^LOGIN~Y." The conversion mechanism ensures that the file is converted to the same DOS name every time that the file is accessed during a session. If the file is copied to another directory, the cookie portion may change.

The mapping that the NFS Option does is only temporary—the name a file is mapped to (not the file itself) is deleted from memory when you reboot your PC. The NFS Option keyword `NFSFileCacheSz` (explained on page 16) determines how much memory is set aside for mapping file names.

Note: Because UNIX systems allow any characters in file names, including control characters, it is possible that when the NFS Option converts a UNIX file name containing control characters to a DOS format, the DOS file name may contain non-ASCII characters, making the file inaccessible from DOS. Avoid creating UNIX file names with control characters. ▲

File Storage: DOS vs. UNIX

Most remote file systems available for PCs using the NFS Option (or another NFS product) are on computers running the UNIX operating system. UNIX stores text files differently than DOS. Normal DOS files use a $^{C}R^{L}F$ (carriage return, linefeed) pair to end a line, while UNIX uses just a ^{L}F to end a line. This is not a problem if text files created by DOS are used only by DOS, and text files created by UNIX are used only by UNIX.

If you want to put a DOS text file on an NFS volume for access by UNIX, use the D2U (DOS to UNIX) command. If you want to be able to access UNIX text files from DOS, the files must be converted to DOS format using the U2D (UNIX to DOS) command. These commands are described on pages 58 and 75, respectively.

File Sharing and Locking

The NFS Option supports both *file sharing* and *file locking*. File sharing is the simpler of the two methods, but file locking is typically more powerful.

If your application makes explicit file locking requests to DOS, the NFS Option will always support these locks, even when neither of the parameters described below is specified. NFS file locks are advisory locks, not mandatory.

If your application locks NFS files larger than 16 Mbytes, you must use the /B parameter when loading the NFS Option (that is, load by issuing the command `WRQNFS /B` at the DOS prompt). Using the /B parameter, however, will not allow OLE 2.0 applications to work correctly due to an incompatibility between DOS file locks and UNIX file locks. If you use an application that uses OLE 2.0 (such as Microsoft Word for Windows or Excel), do *not* use the /B parameter.

File Sharing

With file sharing, DOS controls shared access to NFS server files. When file sharing is enabled, only one user at a time can open a file for both reading and writing. Other users who open the same file can read from the file, but cannot write to it; for these users, DOS marks the file as *read-only*.

File sharing is a simple form of file protection; it makes an entire file available for writing by only one user at a time.

You can turn on file sharing with the NET LINK command by using the `/l:s` parameter. For example:

```
NET LINK e: \\circus\/users/marty marty /l:s
```

By default (without the `/l:s` parameter), drives linked with the NET LINK command do *not* check the access granted by other users to a file: full access is assumed. Most applications do not need file sharing. Further, your private file system does not need sharing if you are the only network user of the files.

In some environments, however, file sharing is not a practical method for providing shared file access. For example, if a number of users must all work in the same server database simultaneously, they may all need to update the database at different times. If file sharing were used, the first user who opens the common database file would make it unavailable for updating by other users. In this situation, *file locking* provides a better solution.

File Locking

With file locking, a *lock dæmon* program on the NFS server controls shared access to server files. You can use file locking only if your server contains the lock dæmon (lockd) program; use the RPCINFO command to determine if a lock dæmon is present (see page 73).

In contrast to file sharing, which changes the access privileges for an entire file at a time, file locking changes the access privileges for only certain *portions* of a file at a time. This allows multiple users simultaneous access to the same file—such as a common database located on an NFS server—with only that portion of the file that each user is working on being locked from other users.

The `/l:c` or `/l:cs` parameter for the NET LINK command tells the NFS Option to attempt to use the server's lock dæmon for sharing and locking. This should be used when files are to be locked/shared with any machines that support only the lockd mechanism of locking and sharing.

Note: Use the `c` (compatibility) parameter with some caution. Not all versions of lockd can support sharing and locking correctly, and using this parameter may not provide adequate protection against shared file access. ▲

CHAPTER 4

Microsoft Windows and the NFS Option

The NFS Option functions under Microsoft Windows without modification. You must be running Windows in enhanced mode, and the advanced features of the NFS Option are available only when the WRQ network drivers (WRQNFS.DRV and VWRQNFS.386) are installed.

To use the NFS Option under Windows, the following lines for the WRQ drivers are added to SYSTEM.INI under the [boot] and [386Enh] headings during Setup:

```
[boot]
network.drv=<nfspath>\wrqnfs.drv
[386Enh]
device=<nfspath>\vwrqnfs.386
```

If you use Windows for Workgroups, different changes are made to SYSTEM.INI. Further, Windows for Workgroups reserves some of your PC drive letters, making fewer drives available as NFS drives. See page 45 for more information about using the NFS Option with Windows for Workgroups.

Using the NFS Option concurrently with Novell's NetWare is no problem either: both networks can be managed by Microsoft Windows. As when running the NFS Option in DOS, the LASTDRIVE statement added to your CONFIG.SYS file during Setup determines the last available drive letter you can use for linking remote file systems (see page 8).

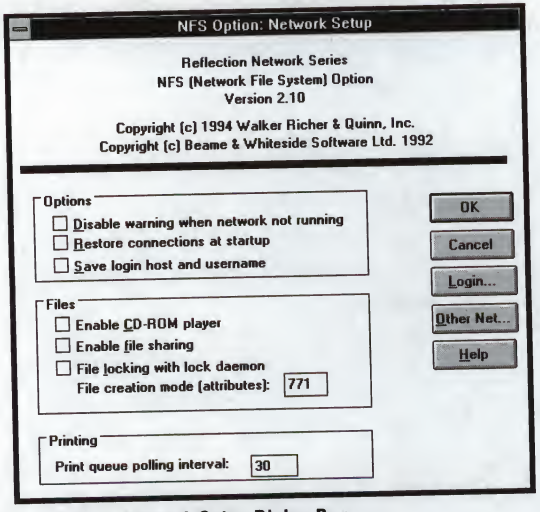
Note: To run Windows applications from an NFS server, the application's .EXE and .DLL files must have both read and write permissions on the server. This is required by Windows when opening the application files. If you have trouble running a server-based Windows application, ensure that the application and its .DLL files have the correct file permissions. ▲

Configuring NFS Option Settings for Windows

To configure NFS Option settings that are used when you link remote file systems and printers from within Windows, you use the Network option in the Control Panel. Open the Control Panel window, then open the Network icon:

Network

The NFS Option: Network Setup dialog box is displayed:



NFS Option: Network Setup Dialog Box

The NFS Option saves your Network control panel settings to the WRQNFS.INI file, stored in your Windows directory.

Disable Warning When Network Not Running

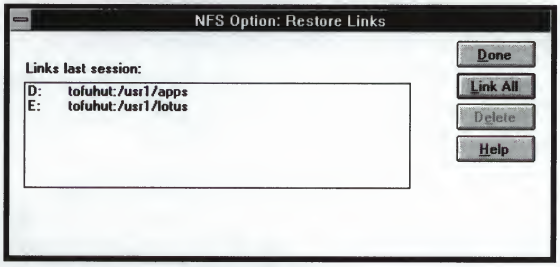
If the NFS Option is not loaded when you start Windows, a warning dialog box is displayed, unless you select "Disable warning when network not running." If you plan on running NFS all the time, clear this check box: you should be warned when the program is not running. The equivalent keyword in WRQNFS.INI is `Netwarn`.

Values: *Selected*
Cleared (default)

Restore Connections at Startup

Select "Restore connections at startup" if when you restart Windows, you want the NFS Option to restore any links to remote file systems and printers you had previously made in Windows.

When you select this check box, the links you make in Windows (from the File Manager and Print Manager) are recorded in the WRQNFS.INI file. The next time you start Windows, the NFS Option: Restore Links dialog box opens:



NFS Option: Restore Links Dialog Box

This dialog box lists all of the links from your last session, and gives you the opportunity to re-link all devices, continue without re-linking, or update the WRQNFS.INI file to delete specific devices.

Even if you select "Restore connections at startup," network logins for linking remote devices are not saved; unless you performed a login from DOS before starting Windows, you're prompted for a user name, password, and authentication server before the links are restored. To speed the login procedure, you can save your NFS host and user name, using the check box described next.

The equivalent keyword in WRQNFS.INI is `NFSRestore`.

Values: *Selected*
Cleared (default)

Save Login Host and Username

Select "Save login host and username" to save the name of the authentication server and the user name you use to log in to the server. When you restart Windows, the saved information is used to speed the login procedure; however, you'll still need to enter your password. The equivalent keyword in WRQNFS.INI is `NFSSaveLogin`. The login host is saved in WRQNFS.INI as `NFSAuthHost`, and the user name is saved as `NFSUsername`.

See "User Authentication in Windows" on page 36 for more information.

Values: *Selected*
Cleared (default)

Enable CD-ROM Player

Select "Enable CD-ROM player" to allow the use of ISO-standard CD-ROM based file systems on NFS servers. The ISO naming convention for CD-ROM files appends a semicolon and version number to the file name (for example, MYFILE.DAT;1). This works as though the user had entered a NET LINK command with the `/cd` parameter. See page 65 for information about the NET LINK command. The equivalent keyword in WRQNFS.INI is `NFSCDROM`.

Values: *Selected*
Cleared (default)

Enable File Sharing

Select "Enable file sharing" to cause all File Manager network connects to be performed with DOS file sharing enabled. This works as though the user had entered a NET LINK command with the `/l:s` parameter. See page 29 for more information about file sharing; see page 65 for information on the NET LINK command. The equivalent keyword in WIN.INI is `NFSShare`.

Values: *Selected*
Cleared (default)

File Locking with Lock Dæmon

Select "File locking with lock dæmon" to use the NFS server's rpc.lockd dæmon for file locking and sharing. This works as if the user had entered a NET LINK command with the `/l:c` parameter. See page 30 for more information about file locking; see page 65 for information on the NET LINK command. The equivalent keyword in WRQNFS.INI is `NFSLock`.

Values: *Selected*
Cleared (default)

File Creation Mode (Attributes)

The "File creation mode (attributes)" text box lets you specify default file protection attributes for files created on or copied to an NFS drive. This works as if the user had specified a protection attribute using the NET PROT command. See page 68 for more information on the NET PROT command. The equivalent keyword in WRQNFS.INI is `NFSMode`.

Values: *0–777*
771 (default)

Print Queue Polling Interval

The "Print queue polling interval" text box allows you to set the interval between successive queries of remote print queues by the Print Manager. A low value should be avoided because it puts a considerable load on the network. The equivalent keyword in WRQNFS.INI is `NFSPoll`.

Values: *<value>*
30 (default)

User Authentication in Windows

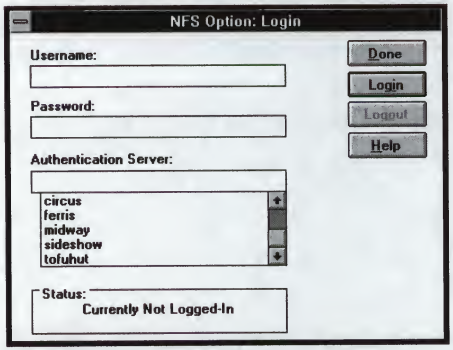
As explained on page 21, authentication is a form of security in which the PCNFSD dæmon on an NFS server validates the user name and password before access is granted to the server, and before remote printing services are available.

From DOS, you use the NET LOGIN command to perform authentication. If you've already done this in DOS, you cannot log in again from Windows.

If you haven't been authenticated from DOS, you can log in to the network from within Windows using this procedure:

1. You can use one of three methods to log in:
   - From the Network control panel, choose the Login button.
   - From File Manager, choose Connect Network Drive from the Disk menu, then in the NFS Option: Link Drives dialog box, choose the Login button.
   - From Print Manager, choose Network Connections from the Options menu, then in the NFS Option: Link Printers dialog box, choose the Login button.

   When you choose the Login button, the NFS Option: Login dialog box opens:



NFS Option: Login Dialog Box

The Status box at the bottom of the dialog box shows whether you're currently logged in, and if so, from where the login was performed (DOS or Windows).

2. In the Username field, enter your user name for the NFS server. Since most NFS servers are UNIX hosts, the user name is typically case sensitive.

3. In the Password field, enter your password for the NFS server. Since most NFS servers are UNIX hosts, the password is typically case sensitive.

   When you type in the Password field, your typing appears as asterisks to keep your password secure.

4. In the Authentication Server field, enter the name of the NFS server that provides your network with authentication services. This must be an NFS server running the PCNFSD program.

   You can also select a name from the text box below this field. The names that appear in this text box come from the HOSTS file on your PC.

5. Choose the Login button to log in to the network and obtain authentication.

If authentication succeeds, the NFS Option: Login dialog box closes, you return to the previous dialog box, and the status text at the bottom of the dialog box reads "Logged in from Windows." (If you log in from the Network control panel, you must re-open the NFS Option: Login dialog box to see the status text.) If authentication fails, an error message tells you why, and you remain in the NFS Option: Login dialog box so you can try logging in again.

Once you're authenticated, you can link drives and printers as explained starting on the next page.

If you want to save the name of the authentication server and your user name so you don't have to enter this information each time you start Windows, go to the Network control panel and select the "Save login host and username" check box. You'll still need to enter your password, however, to obtain authentication.

Logging Out

When you're done working with remote file systems and printers, you can log out of the network. This helps maintain security and it protects your files by preventing other users from using your PC to gain access to network services.

To log out of the network, choose the Logout button in the NFS Option: Login dialog box, which you can get to from the Network control panel, File Manager, or Print Manager. (See the section above for instructions on getting to the NFS Option: Login dialog box.)

If you have linked any remote drives or printers from within Windows when you choose Logout, all of the linked devices must first be disconnected; a warning message alerts you to this when you log out. Links made from DOS, however, are not disconnected when you log out from Windows.

After you log out, the status text at the bottom of the NFS dialog boxes changes to read "Currently Not Logged-In."

Linking File Systems and Printers in Windows

When using the NFS Option under Microsoft Windows, you can link remote file systems and printers in two ways:

- Before running Microsoft Windows—use the procedures in the previous chapter to link remote file systems and printers from DOS. The linked systems are then available when you run Windows.

  You need to use this method of linking if you use Windows for Workgroups version 3.10; see page 45 for more information.

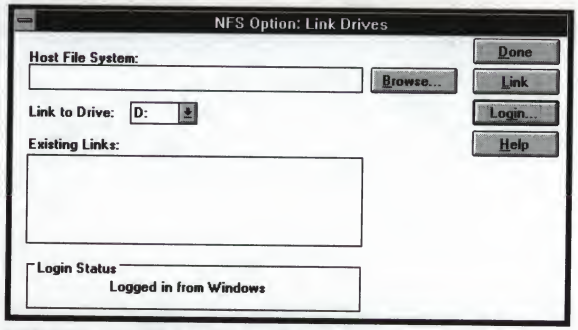
- From within Windows (when the NFS Option network driver is installed)—use the File Manager to link file systems, and the Print Manager to link printers.

Warning: Do *not* link file systems and printers using a DOS window from within Windows. If you do, you may be left with "ghost" devices once you return to Windows or exit Windows and return to DOS. These ghost devices appear to be linked, but they are not actually available. In some situations, it is possible to hang your PC if you try to access a ghost device from within a DOS window that was unlinked elsewhere. Further, you will not be able to unlink or relink these ghost devices until you reboot your PC. ▲

Using the File Manager to Link a File System

To link a remote file system to a PC drive letter using the File Manager:

1. In the File Manager, choose Connect Network Drive from the Disk menu. The NFS Option: Link Drives dialog box appears:



NFS Option: Link Drives Dialog Box

2. In the Host File System text box, enter the name of the remote file system you want to link.

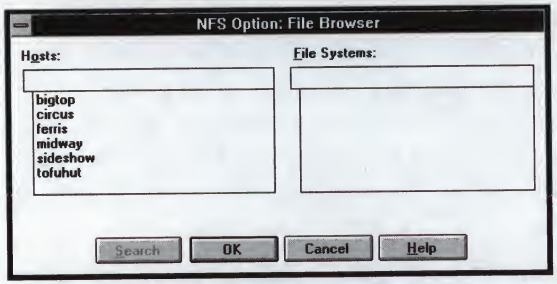
   The syntax for naming a remote file system is as follows:

   ```
   \\<host>\<name>
   ```

   The *<host>* is the name or Internet address of an NFS server on the network. The *<name>* is the name of the remote file system (for example, /users/nora). An example of a host name and file system entry might be:

   ```
   \\circus\/users/nora
   ```

   If you don't know the names of your NFS servers or the names of the remote file systems, choose the Browse button in the NFS Option: Link Drives dialog box. This opens the NFS Option: File Browser dialog box:



NFS Option: File Browser Dialog Box

This dialog box can be used to select hosts to link, and to browse machines for available file systems. First select a host name from the list at the left (or enter a host name or Internet address in the text box), then choose the Search button to search for file systems on that host. Querying machines that are very distant from you may take some time.

Next, from the File Systems list on the right, select the file system you want to link (or enter the name of a file system in the text box), and choose OK.

When you return to the NFS Option: Link Drives dialog box, the host name and file system are entered in the Host File System text box with the correct syntax for linking.

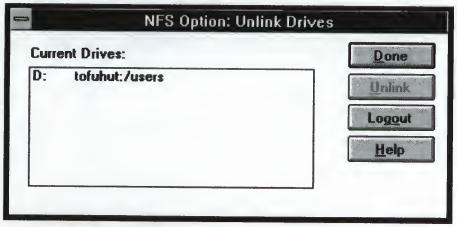
3. Using the Link to Drive list box, select the PC drive to which you want to link the remote file system. (The drives that are available are defined by the LASTDRIVE statement in your CONFIG.SYS file; see page 8.)

4. Choose Link to link the remote system.

After a few moments, the new link appears in the Existing Links list. If the connection fails, an error message tells you why.

Unlinking a File System

To unlink a file system, you use the NFS Option: Unlink Drives dialog box. Choose Disconnect Network Drive from the File Manager's Disk menu to open this dialog box:



NFS Option: Unlink Drives Dialog Box

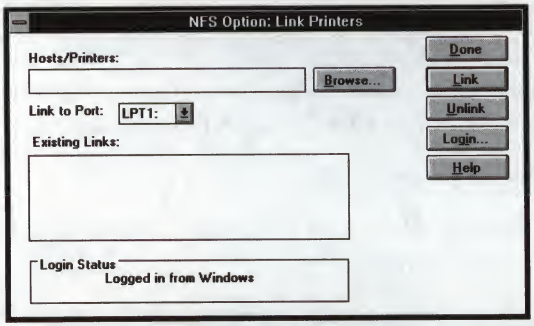
From the Current Drives list, select the name of the system you want to unlink, then choose the Unlink button.

After a few moments, the file system is unlinked and its name is removed from the list.

Using the Print Manager to Link a Printer

To link a remote printer using the Windows Print Manager:

1. In the Print Manager, choose Network Connections from the Options menu. The NFS Option: Link Printers dialog box opens:



NFS Option: Link Printers Dialog Box

2. In the Hosts/Printers text box, enter the name of the remote printer you want to link.

   The syntax for naming a remote printer is as follows:

   ```
   \\<host>\<name>
   ```

   The *<host>* is the name or Internet address of an NFS server on the network. The *<name>* is the name of the remote printer as defined on the server in /etc/printcap (for example, lpnfs). An example of a host name and printer entry might be:

   ```
   \\bigtop\lpnfs
   ```

   If you don't know which NFS servers are available, choose the Browse button in the NFS Option: Link Printers dialog box. This opens the NFS Option: Print Browser dialog box, where you can select a host on which a remote printer resides. After selecting a host, you can enter the name of the printer in the Print Queue text box, or choose OK to return to the NFS Option: Link Printers dialog box. The host name (and printer name, if you entered one) is inserted in the Hosts/Printers text box with the correct syntax for linking. If you didn't enter a printer name in the browser, you must do so in the NFS Option: Link Printers dialog box before you can link the remote printer.

3. Using the Link to Port list box, select the PC printer port to which you want to link the remote printer.
4. Choose Link to link the remote printer.

After a few moments, the new link appears in the Existing Links list. If the connection fails, an error message tells you why.

Unlinking a Printer

The same dialog box that is used to link remote printers is also used to unlink them.

To unlink a printer, select the name of the printer you want to unlink from the Existing Links list in the NFS Option: Link Printers dialog box, then choose the Unlink button.

The printer is unlinked and its name removed from the list.

Using the Printers Control Panel to Link and Unlink Printers

You can also link and unlink printers using the Printers option in the Control Panel, though this is a less direct method than using the Print Manager.

In the Control Panel, open the Printers icon, choose Add and select a printer from the List of Printers. Choose Install, and then choose Connect. In the Connect dialog box, choose Network to get to the NFS Option: Link Printers dialog box. Then follow the steps above as if you were using the Print Manager.

Using Other Networks with the NFS Option

If you use Novell NetWare with the NFS Option, the Network control panel includes an Other Net button for configuring your NetWare options. When you choose the Other Net button, the NetWare configuration dialog box is displayed; your Novell documentation should explain how to use the options available.

If you use a network operating system other than NetWare (such as Microsoft LAN Manager), the Other Net button is dimmed. If you need to configure your other network from within Windows, you must perform all configuration from DOS before you start Windows; network services will then be available once you're in Windows.

If you prefer to make the NFS Option your secondary network in Windows, and make your other network your "network of choice" for Windows, you must edit your SYSTEM.INI file to switch the network drivers. When you do this, however, you will not be able to use the NFS Option in Windows to log in or link drives and printers—you will need to perform all logins and linking from DOS before you start Windows; then, once you're in Windows, your NFS services will be available.

When the NFS Option Setup program modifies your SYSTEM.INI file to include the NFS Option driver for Windows (the file WRQNFS.DRV), the network line for your other network operating system is commented out. If you use LAN Manager, for example, the [boot] section in your SYSTEM.INI file might have these lines after installing the NFS Option:

```
;network.drv=lanman21.drv
network.drv=c:\wrqnet\wrqnfs.drv
```

The first `network.drv` line is commented out by the semicolon, making the second `network.drv` the current network for Windows; in this case, the NFS Option. To switch the networks so that your other network is your primary network in Windows, use a text editor to open your SYSTEM.INI file, remove the semicolon from the other network line, and add a semicolon to the WRQNFS.DRV line. For example:

```
network.drv=lanman21.drv
;network.drv=c:\wrqnet\wrqnfs.drv
```

After making these changes, save your SYSTEM.INI file as text only. To have the changes take effect, you need to restart Windows. Then, to log in and link NFS devices, use the DOS procedures in the previous chapter before you start Windows.

Using the NFS Option with Windows for Workgroups

Microsoft Windows for Workgroups functions like a network operating system with regard to the NFS Option. If you run Windows for Workgroups, the NFS Option Setup program can detect this and update your system files accordingly. In some cases, however, you may need to manually edit your SYSTEM.INI file. Using Windows for Workgroups, and manually editing SYSTEM.INI if necessary, are described below.

Note: If you use Windows for Workgroups version 3.10, you cannot use the NFS Option to link drives and printers from within Windows. This is because version 3.10 of Windows for Workgroups does not use the `secondnet.drv` statement in SYSTEM.INI, as described below. If you use version 3.10 of Windows for Workgroups, you must link all of your NFS devices from DOS before starting Windows; your remote devices will then be available once you're in Windows. ▲

Setting the LASTDRIVE

When you run the NFS Option Setup program and specify a "Last drive" in the Basic Configuration screen, Setup adds a LASTDRIVE statement to your CONFIG.SYS file. The LASTDRIVE statement determines how many PC drive letters are available as NFS drives. For example, if your PC hard drive is C:, a LASTDRIVE of I: allows for six NFS drives—D: through I:. Any other network drives begin after the LASTDRIVE.

If you use Windows for Workgroups and log on to a workgroup (rather than a domain), the first three drive letters after your PC's last drive are reserved (for example, D:, E:, and F:). Your NFS drives begin after the last reserved drive, again ending at the letter specified by the LASTDRIVE statement. If you want six NFS drives available then, you must add an extra three drive letters to your PC's last drive letter; for example, if your PC's last drive is C: and you want six NFS drives available, your LASTDRIVE should be at least L:. Windows for Workgroups will use drive letters D:, E:, and F:, making G:–L: available as NFS drives.

To change your LASTDRIVE, you can either re-run Setup and specify a new drive letter, or you can manually edit your CONFIG.SYS file and change the LASTDRIVE statement. After changing the LASTDRIVE statement, you must reboot your PC to have the change take effect.

Changes to SYSTEM.INI

If you're running Windows (not Windows for Workgroups), the changes that the NFS Option Setup program makes to SYSTEM.INI are shown on page 31. If you're running Windows for Workgroups, different lines get added to the [boot] and [386Enh] headings:

```
[boot]
secondnet.drv=<nfspath>\wrqnfs.drv
[386Enh]
device=<nfspath>\vwrqnfs.386
```

Another line, `network.drv=<nfspath>\wfwnet.drv`, which is written to SYSTEM.INI by Windows for Workgroups, is retained. This makes Windows for Workgroups act as one network (with the `network.drv` line), and the NFS Option work as a second network (with the `secondnet.drv` line).

If you already have a second network installed, and therefore already have a `secondnet.drv` line, the NFS Option Setup program does *not* make any changes to this line.

Because you can have only two networks active in Windows, you must decide whether to use the second network already present, or the NFS Option. If you want to use the NFS Option, you must manually edit your SYSTEM.INI file to include the `secondnet.drv` line shown above.

If you omit the NFS Option's `secondnet.drv` statement, you cannot link remote file systems or printers from within Windows; instead, you must link and unlink drives and printers in DOS before starting Windows, as described in the previous chapter. As long as you have the `vwrqnfs.386` device line present in SYSTEM.INI (as shown above), your NFS drives and printers will still appear, and will still be accessible from within Windows.

Accessing NFS Option Dialog Boxes

When using Windows for Workgroups, the way you get to the NFS Option dialog boxes from the Network control panel, File Manager, and Print Manager differs slightly from the access methods described for Windows.

In the Network control panel, File Manager, and Print Manager, Windows for Workgroups labels a button "BW-NFS," which gives you access to the NFS Option dialog boxes. Once you're in the NFS Option dialog boxes, they function the same as for Windows.

CHAPTER 5

Printing

Under DOS there are four ways that an application can print on a directly connected printer. The NFS Option can redirect three of these methods to a network printer. The fourth method, direct hardware output to the printer I/O port, is hardly ever used by application programs and cannot be redirected by any software method.

The three methods all produce the same printed output, but each queues the print job to the networked printer at a different time:

- Printouts created by applications that print using BIOS interrupt 17h are queued 30 seconds after the last character is sent.
- Printouts created by applications that print using the open handle 4 are queued when the application exits. Pressing Ctrl-Shift-PrtSc queues the printout.

  Some applications use handle 4 and disable the Ctrl-Shift-PrtSc keystroke. These applications typically allow the output device to be either LPT<n>: or a DOS file. If you want your printouts queued immediately after printing, set the output device to a DOS file and make the DOS file "PRN:".

  The application opens the file PRN:, sends the printout, and then closes the file. When the file is closed, the printout is queued.

- Printouts created by applications that open the file PRN: (or LPT1:, LPT2:, and so on) are queued when the application closes the file. Pressing Ctrl-Shift-PrtSc queues the printout.

PostScript Printers

In most cases, applications that produce PostScript output will print to a PostScript printer that has been mounted using the NFS Option, without any special parameters. If the printer you are mounting requires a special PostScript header, however, use the `/p` parameter with the NET LINK command. This adds a header to the start of each print job. The header text can be viewed with the NET PRTSETUP command after the device is linked.

If you have mounted a printer from within Windows, specifying a PostScript printer in the Print Manager, you do not need to use the `/p` parameter.

If you know that your application creates correct PostScript files, do *not* use the `/p` parameter. This is generally the case with most Windows and many DOS applications.

SECTION 2

Reflection Network Series NFS Commands

This section is an alphabetical reference for the Reflection Network Series NFS Option commands. Many of these commands are also used in other products: the Thompson Toolkit from Thompson Automation, Inc., for example, also has the commands DF and LS. Make sure that your DOS path is set up so that you are using the set of commands that you intended.

For on-screen syntax help with these commands, use `<command> /?`. If a command seems to be taking an inordinate amount of time, you have probably made an error. Press Ctrl-Break to abort the command.

Chapter 6

NFS Commands **53**

CHAPTER 6

NFS Commands

The following commands are available with the NFS Option. Because NFS was originally designed for UNIX host systems, most NFS Option commands have a UNIX-like command syntax. The alphabetical command reference, which starts on page 55, explains each command in more detail.

File manipulation

CHMOD	Change the protection on your files—who has access to them and to what extent.
D2U	Convert text files from DOS format to UNIX format.
LS	Display information about the contents of local or host directories.
U2D	Convert text files from UNIX format to DOS format.

Getting information

DF	Display information about all mounted drives: the amount of disk space used and the amount of space available.
EXPORTS	Report which file directories are available for mounting.
NET USE	Show all mounted drives.
QUOTA	Display disk quotas, if any, on all mounted drives.
RPCINFO	Show the remote services available on a specific server.
YPCAT	Show values in a Yellow Pages map.
YPMATCH	Show the value for a keyword in Yellow Pages.

Printing commands

NET PRTSETUP	If you are using a printer that can emulate a number of different printer types, an initialization string is used to specify the type. Use NET PRTSETUP to send that string.

Remote commands

REXEC	Execute a non-interactive command on a remote system. A password is required.
RSH	Execute a non-interactive command on a remote system. No password is required.

Network commands

NET LINK	The NET LINK command links (or *mounts*) a local DOS drive on a host file system (the hierarchy of files on a remote system). The directory or printer name on the host is associated with the local device. The device is either a disk (C:–Z:) or a DOS device (PRN, LPT1, LPT2, LPT3, LPT4, COM1, COM2, COM3, or COM4).
NET LOGIN	Authenticates a user on a host.
NET LOGOUT	Unlinks all remote devices and removes the user login.
NET PROT	Sets default file protection, overriding whatever is set with the `FileModeMask` keyword during the NFS Option Setup.
NET UNLINK	Removes the remote links created by the NET LINK command.
NET USE	For linking file systems and printers, NET USE is provided as an alternate form of NET LINK for users familiar with Sun Microsystem's PC-NFS product and its NET USE command syntax.
REMLOCKS	Remove all record and file locks being held on a particular host.

CHMOD

```
CHMOD [-fr] <mode> <filename>
```

Change the protection or *mode* of a file or files on the UNIX server. (This command cannot be used on local files.) Only the owner of a file can change its mode. You can specify multiple files on the DOS command line or use wildcards to change the protection on a number of files at once. The `<mode>` of each named file can be *absolute* or *symbolic*.

Absolute Mode

An absolute mode is any combination of the following octal values:

001	Execute (search) by others
002	Write by others
004	Read by others
010	Execute (search) by group
020	Write by group
040	Read by group
100	Execute (search in directory) by owner
200	Write by owner
400	Read by owner
1000	Sticky bit
2000	Set group ID on execution (this bit is ignored if the file is a directory; it may be set or cleared only using symbolic mode)
4000	Set user ID on execution

Symbolic Mode

A symbolic mode has the form:

```
[<who>]<op><permission>[,<who><op><permission>]...
```

`<who>`

Use a combination of these parameters to set the protection of the specified file for one or more classes of users:

`u`	User permissions
`g`	Group permissions
`o`	Others
`a`	All (the equivalent of `u`, `g`, and `o`)

If none of these parameters is used, the parameter `a` is assumed. (Your file creation mask settings are, however, taken into account; CHMOD will not override the restrictions of your user mask.)

`<op>`

The operation, or type of change, can be one of the following:

`+`	To add the *<permission>*
`-`	To remove the *<permission>*
`=`	To assign the *<permission>* explicitly; all other bits for that category, owner, group, or others, are reset

`<permission>`

The permissions that are changed can be any combination of the following:

`r`	Read
`w`	Write
`s`	Set owner or group ID. This is only useful with `<who>`, `u` or `g`. Also, the set group ID bit of a directory may only be modified with `+` or `-`.
`t`	Set the sticky bit to save program text between processes.
`x`	Gives permission to execute a file and allows "view" or search permission on directories.

Omitting permission is useful only with the `=` operator, which takes away all permissions. Multiple symbolic modes can be given; separate them with commas. Operations are performed in the order specified. For example, use the following command to give yourself read, write, and execute permission, and give all others just read permission on a file called SCHED.TXT:

```
chmod u=rw,go=r sched.txt
```

Optional Parameters

`-f`

Force. If the mode of a file does not change, no error is reported.

`-r`

Recursive. The CHMOD command recursively descends through the directory structure and sets all files matching *filename* to the specified mode.

Examples

The first example denies write permission to others. The second allows group members to read the file:

```
chmod o-w sched.txt
chmod g+r sched.txt
```

The next example sets read, write, and execute permission for the owner of the files, and read permission only for others:

```
chmod u=rwx,o=r sched.txt readme.txt delall.bat
```

D2U

```
D2U [-b | -l | -u] [-f] <input_file> <output_file>
```

The D2U command converts text files from DOS format to UNIX format. Lines in DOS text files are terminated by a carriage return/linefeed pair, while lines in UNIX text files are terminated by a single linefeed. D2U removes each carriage return that precedes a line feed and deletes the DOS end-of-file marker (Ctrl-Z). D2U is for use in converting text files only.

`-b`

Binary. Allows 8-bit character codes to be preserved in the output file. Without this parameter, 8-bit codes are converted to 7-bit codes.

`-l`

Lowercase. Converts alphabetic characters in the input file to lowercase in the output file.

`-u`

Uppercase. Converts alphabetic characters in the input file to uppercase in the output file.

`-f`

Force. Ordinarily, carriage return characters are removed in the DOS to UNIX conversion and carriage return/linefeed pairs become linefeed characters. This parameter preserves carriage return characters in the output file.

`<input_file>`

The name of the DOS file to perform the conversion on.

`<output_file>`

The name of the output file to create after the conversion. If an output file of the same name already exists, it is overwritten.

DF

```
DF
```

DF displays the amount of disk space occupied by all currently mounted file systems, the amount of used and available space, and how much of the file system's total capacity has been used. For example, the information displayed might look like this:

```
Filesystem            Kbytes    Used   Avail Capacity  Mounted on
------------------------------------------------------------------
NAME_BRAND_PC         328896  259528   69368    79%          C:
bigtop                 47175   43581    3594    92%          E:
SYS                   524280  213136  311144    41%          G:
WRQ250                262140  109056  153084    42%          H:
```

The sum of the values in the Used and Avail columns may be less than the amount of space in the file system (Kbytes). This is because the system reserves a fraction of the space in the file system to allow its file system allocation routines to work well. The amount reserved is typically about 10% on networked drives.

When all the space on a file system except for this reserve is in use, only the superuser (a user with system-wide privileges, usually the system administrator) can allocate new files and data blocks to existing files. When a file system is over-allocated in this way, the DF command may report that the file system is more than 100% utilized.

A bug in many NFS servers causes the DF command to report 100% free when the disk is completely full.

EXPORTS

```
EXPORTS <host>
```

EXPORTS reports which file systems are available for mounting on a given host. It queries the *<host>* (either a host name or an IP address) for all file systems available for mounting. Each file system is displayed with a list of access groups that have authorization to mount the file system.

Example

As an example, you could use the EXPORTS command on the host called admin by typing the following at the DOS prompt:

```
exports admin
```

The list of access groups is reported as follows:

```
Export list for ADMIN
/       (everyone)
/users (everyone)
```

LS

```
LS [-abcCdFglnrstu1] <filename(s)>
```

The LS command displays information about local and host files:

- Name
- Size
- Creation date
- Modification time
- Access permission(s)

For each file, the LS command displays the name and any other information requested. If the file name is a directory, the files within the directory are listed. When no parameters are used, the contents of the current directory are listed. By default, the output is sorted alphabetically.

`-a`

Lists all entries, including hidden files (hidden files are files whose remote name begins with a period). The `-a` parameter can be used in combination with other parameters.

`-b`

Displays both DOS and UNIX format file names. For example:

```
YPCAT.EXE          ypcat.exe
YPMATCH.EXE        ypmatch.exe
^HISTORY.~QE       .history
^LOGIN~E.F         .login
^PROFILE.~UF       .profile
```

See page 27 for a description of how the NFS Option handles the differences between these two file formats.

`-c`

Displays the time and date when files were last changed (either created, modified, or changed attributes) when sorting or displaying the directory list. This parameter is relevant only when used with the `-l` or `-t` parameters. When used with `-l`, the file listing includes the time and date, and is sorted alphabetically. When used with `-t`, the file listing is sorted first by time modified, then alphabetically.

`-C`

Forces 80-column output with files sorted down the columns. This is the default for console output.

`-d`

Shows the current directory or subdirectory as a file name only, without listing the files it contains. The `-d` parameter can be used in combination with other parameters.

`-F`

Lists only directories within the current directory, not the contents of each directory.

`-g`

Shows the group ownership of the file when used in conjunction with `l`.

`-l`

Shows the total number of blocks (of 1024 bytes each) in the current directory, and lists file information, one file per line. For example:

```
total 115
-rwxrwxrwx  1   273        21083 Apr 15 10:05 remlocks.exe
-rwxrwxrwx  1   273        33495 Apr 13 12:27 rexec.exe
-rwxrwxrwx  1   273        30848 Apr 15 11:36 wrqnfs.exe
-rwxrwxrwx  1   273        33309 Apr 13 12:27 rsh.exe
```

The file information shown is as follows:

Protection

The protection information shown is a string of 10 characters. The first character can be one of the following:

`d` Directory

`b` Block-type special file

`c` Character-type special file

`l` Symbolic link

`p` Named pipe

`s` Socket normal file

`-` Normal file

The next 9 characters are interpreted as three sets of three characters, with each set showing:

- The owner's access permissions
- Permission granted to other users in the same group
- Permission granted to the rest of the world

Within each of the three sets, the three characters indicate permission to read, write, or execute the file as a program. For directories, execute permission allows a user to search the directory. The permissions are indicated as follows:

`r` Read access

`w` Write access

`x` Executable permission is granted

`-` Permission is not granted

The owner's execute permission is displayed as `S` if the file has the set-user-id bit set. The group execute permission is displayed as `s` if the file has the set-group-ID bit set.

The last character of the permission block is displayed as `t` if the "Save swapped text after use" bit is on. The set-ID and `t` bits are capitalized (`S` and `T`) if the corresponding execute permission is not set.

Number of links

The second column shows the number of symbolic links to the file.

Owner

The third column shows the UID (user identification) number of the file's owner. If the `g` option is also used, an additional column shows the GID (group identification) of the group to which the file owner belongs.

Size in bytes

The fourth column shows the size of the file, in bytes. Because the server and PC often have different file structures, the size in bytes reported by `ls -l` may differ slightly from the size reported if you copy the file to your PC and use the DOS DIR command.

Time or date of last modification

For a DOS file listing, the date and year are shown next. For a listing of files on a mounted drive, the date and time are shown if the file is no more than six months old. Older files show the date and year that the file was last modified.

File name

The rightmost column shows the name of the file in UNIX format. For UNIX files, names are case sensitive.

`-n`

Displays the UNIX format file names.

`-r`

Lists files in reverse alphabetical order. If used in conjunction with `-t`, files are listed in reverse time, from oldest to most recent.

`-s`

Gives size of each file in kilobytes.

`-t`

Sorts files by time. Default time used is the last time modified. `-c` and `-u` modify the default as described.

`-u`

Displays the time that the file was last accessed (normally displays the time last modified). This is relevant only when used with `-l` or `-t`. When used with `-l`, the display is sorted alphabetically. When used with `-t`, the display is sorted first by the time the file was last accessed, then alphabetically.

`-1`

Forces one entry per output line. This is the default when output is redirected to a file.

NET

The NET command has a number of different forms:

NET LINK

```
NET LINK <device> \\<host>\<name> [{<username> [<password>]}]
        [/l:sc] [/r:<read_size>] [/w:<write_size>] [/cd] [/p]
        [/v:<volume_label>]
```

The NET LINK command links (or *mounts*) a local DOS drive on a host file system. The directory or printer name on *<host>* is associated with the local device. The *<device>* is either a disk (C:–Z:) or a DOS device (PRN, LPT1, LPT2, LPT3, LPT4, COM1, COM2, COM3, or COM4). The *<host>* is the name or Internet address of an NFS server on the network. The *<name>* is either the remote file system name (for example, /users/fellini), or the printer name as defined in /etc/printcap (for example, lpnfs). If no *<username>* or *<password>* arguments are specified, the username and password previously authenticated with the NET LOGIN command are used to grant access (see page 67 for more on the NET LOGIN command).

Some of the parameters that can be used with the NET LINK command are valid only for linking file systems, while others are valid only for linking printers. These parameters are indicated below.

`<username> [<password>]`

When included, the argument after \\<host>\<name> is interpreted as a user name. If the password argument is not specified, the user is prompted for the password. The password is echoed as dashes. This username/password is used as the authorization for the link command. The username/password can be omitted if authentication was performed previously with a NET LOGIN command.

`/l:sc`

This parameter is valid only for linking file systems. It selects the type of file locking, and can be any combination of the following characters:

`s`

Use DOS file sharing. This causes a server file that was opened by one user to be marked as *read-only* for other users who open the file.

`c`

Compatibility. Use the server's rpc.lockd dæmon for locking and sharing. This is required only if files are to be shared with machines that use only rpc.lockd for locking. This switch allows the server's lock dæmon to protect specific blocks of a file from access by multiple users at once.

See "File Sharing and Locking," which begins on page 29, for more information.

`/r:<read_size>` and `/w:<write_size>`

These sizes apply only to the specified device and will override the settings in NET.CFG or PROTOCOL.INI; refer to the description of `NFSReadSize` and `NFSWriteSize` on page 17. These parameters are valid only for linking file systems.

`/cd`

This parameter allows the use of ISO standard CD-ROM based file systems on NFS servers. The ISO naming convention for CD-ROM files appends a semicolon and version number to the file name. For example, the file MYFILE.COM;1 should be accessed from DOS as MYFILE.COM. This parameter is valid only for linking file systems.

`/p`

This parameter is used to indicate that the remote printer device is a PostScript printer. This parameter is valid only for linking printers.

If a text file such as AUTOEXEC.BAT is sent to a PostScript printer it will not be printed, since PostScript printers use a Page Description Language to control the printed output. When the `/p` parameter is specified with the NET LINK command, the following header line is added to the start of each printout that is sent to the linked print queue:

```
%!  Adobe PostScript for (WRQNFS)
%
```

This allows a normal text file to be printed on a PostScript printer. However, you should not use this parameter if the application that you're printing from creates correct PostScript files. This is generally the case with most Windows and DOS applications.

`/v:<volume_label>`

The *<volume_label>* should be 11 characters or fewer. This parameter is used to set the value of the DOS volume label associated with a net linked drive. This is useful when software expects a specific DOS volume label on a drive. It is also used in the output for the NET USE command. This parameter is valid only for linking file systems.

For example, if a drive is mounted with the following command:

```
NET LINK F: \\circus\/users/fellini samf /v:prod_film
```

then the command NET USE displays the following output:

```
Device  Host     Path/Volume    Created       Read  Write    Prot
-------------------------------------------------------------------
F:      circus   prod_film      DOS           4096  4096     751
```

Without the `/v:prod_film` parameter, the "Path/Volume" column in the NET USE output would read `ers/fellini` (the last 11 characters of the path).

The DIR (directory) command in DOS shows the following at the top of the file list:

```
 Volume in drive F is prod_film
 Directory of F:
mail~mg      <DIR>      10-13-93   8:15a
readme             2242 10-12-93   5:09p
```

Symbolic links cannot be traversed if this parameter is present.

NET LOGIN

```
NET LOGIN [<host>] {[<username>] [<password]}
```

The NET LOGIN command authenticates a user on the *<host>* machine, with *<username>* as the name of the user, and *<password>* the password for authentication. If you omit the host name, username, or password, you're prompted for this information. This authentication is temporary—it affects only the current NFS session; when you unload the NFS Option, reboot your PC, or use the NET LOGOUT command, the validation is gone.

NET LOGOUT

```
NET LOGOUT
```

The NET LOGOUT command unlinks all remote drives and printers and removes the authentication obtained with the NET LOGIN command.

NET PROT

```
NET PROT [<device> [<prot>]]
```

When you link a remote file system, it receives a default file protection code, which is defined by the `FileModeMask` keyword in NET.CFG or PROTOCOL.INI. You can change the default protection code by re-running the NFS Option Setup program and specifying a new file protection (or by editing NET.CFG or PROTOCOL.INI and changing the value of the above keyword).

Once a file system is linked, you can use the NET PROT command to manipulate the file protection code. The new protection remains in effect only as long as the file system is linked; it is not retained if you unlink the file system, unload the NFS Option (WRQNFS.EXE) from memory, or reboot your PC. The NET PROT command is valid only for file systems, not printers.

If no parameters are specified with the NET PROT command, the current protection is displayed as a three-digit octal number. If the setting for the `FileModeMask` keyword is *777*, for example, the command `NET PROT` displays this message:

```
Current default protection : 777
```

When you link a device, this default protection is applied to that device.

To find out what the protection on a device is, type `NET PROT <device>`, where *<device>* is a linked device. This example, for instance, shows the protection for the F: device (the <device> must end with a colon):

```
NET PROT F:
Current protection for device F: 777
```

To change the protection, use this form of the command:

```
NET PROT <device> <prot>
```

For example:

```
net prot f: 751
Current protection for device F: set to 751
```

Any new files created on this device are given the new file protection.

Protection is formed using any combination of the following values:

001	Execute (search) by others
002	Write by others
004	Read by others
010	Execute (search) by group
020	Write by group
040	Read by group
100	Execute (search in directory) by owner
200	Write by owner
400	Read by owner

A protection of `000` prevents all access by all users, while `777` allows anyone to do anything to the file (777 is the sum of all the protection values).

NET PRTSETUP

```
NET PRTSETUP <device> ["<string>" | *<file>]
```

The NET PRTSETUP command sets the printer initialization string—the setup characters that will be sent to a printer. The characters in *<string>* or *<file>* are stored and sent to the printer at the beginning of every printout spooled to the device. If the string and file are missing, the current setup string is printed.

The device must have been previously linked with the NET LINK command. The NET PRTSETUP command is valid only for printers.

The NET PRTSETUP command is important if you have a printer that can emulate several different types of printers. The same printer can be linked to several DOS devices (LPT1:, LPT2:, and so on). By having a different printer initialization string on each DOS device, the printer can be used in all its emulation modes by sending printouts to the specific device.

NET UNLINK

```
NET UNLINK <device>
```

The NET UNLINK command removes the remote bindings created by NET LINK. The *<device>* is unlinked from the remote file system or printer. The device is either a disk (C:–Z:) or a DOS device (PRN, LPT1, LPT2, LPT3, LPT4, COM1, COM2, COM3, or COM4). The device must have been linked by the NET LINK command.

NET USE

```
NET USE
```

The NET USE command shows all mounted drives and printers. The list of linked devices is displayed in the following format:

```
Currently linked devices :

Device  Host          Path/Volume     Created      Read  Write   Prot
-------------------------------------------------------------------
E:      circus        /users/mary     DOS          4096  4096    751
F:      bigtop        /home/mary      File Mgr     4096  4096    751
```

The "Created" column indicates the environment in which the drive was mounted. The E: drive was mounted in DOS (before Windows was started), and the second drive was mounted using the Windows File Manager.

The figures listed in the "Read" and "Write" columns are the size of NFS Option read and write operations—the number of bytes transferred in one request. The sizes are set with the keywords `NFSReadSize` and `NFSWriteSize` in NET.CFG or PROTOCOL.INI.

The "Prot" column shows an octal number that represents the device's level of protection; see page 69 for a table of these numbers.

Using NET USE to Link File Systems and Printers

The NET USE command can also be used as an alternate form of the NET LINK command for linking remote file systems and printers; this form is provided primarily for users familiar with Sun Microsystem's PC-NFS product and its NET USE syntax.

For linking file systems and printers, NET USE has the same syntax and accepts the same parameters as the NET LINK command described on page 65. NET USE also lets you link file systems and printers using this syntax:

```
NET USE <device> <hostname>:<name> [<password>]
```

For example, to link the DOS drive letter D: to the /users/oscar directory on the host called bigtop, you could use either of these two commands:

```
NET LINK D: \\bigtop\/users/oscar
NET USE D: bigtop:/users/oscar
```

QUOTA

```
QUOTA [-qv]
```

QUOTA displays disk quotas for all mounted drives if quotas are active. Quotas are set at the host end; if no quota is in place on a drive, you'll see the message "(No quota)" next to the drive letter. The host operating system program *rquotad* (Remote Quota Dæmon) must be running on the host system; you can use the RPCINFO command to determine if this program is running (see page 73).

`-q`

Quiet. Displays a text line for every driver where quotas are exceeded. Nothing is displayed when no quotas are exceeded.

`-v`

Verbose. Displays a verbose listing of all quotas whether they are exceeded or not.

REMLOCKS

```
REMLOCKS <host>
```

The REMLOCKS command removes all record and file locks being held for the user on *<host>*. Locks cannot be removed selectively.

REXEC

```
REXEC <host> [-l <username>] <command>
```

The REXEC command executes a single command on a host machine, using the rexec ("remote execution") protocol, in which the PC executes a command on a remote machine, and the output is sent to the PC. REXEC should be used with commands that are not interactive: that is, the command should not require further input.

To use REXEC, you must have the Reflection Network Series module WRQHPSO.EXE loaded in memory; WRQHPSO.EXE is included with the Reflection Network Series software versions 2.10 and higher.

The REXEC command is similar to RSH, which is described on page 74. In cases where RSH is not allowed (because RSH does not require a password and is therefore a security risk), use REXEC. After you issue the REXEC command line, you're prompted for your password on the remote host.

`<host>`
: The name of the remote host on which the *<command>* will be executed.

`-l <username>`
: Your login user name on the remote host. If you specified an RSH user name in the NFS Option Setup program (on the Advanced Configuration screen), a SET NETUSER=<username> statement was added to your AUTOEXEC.BAT file, and that user name is used for all REXEC and RSH commands; this parameter is not needed. (The user name for REXEC is case sensitive.)

<command>

The remote command to execute. The output from the command is sent to the PC screen. The command should not be interactive; that is, it should not require any additional information to complete.

RPCINFO

```
RPCINFO <host>
```

The RPCINFO command provides information about the remote procedure calls (RPCs) that the *<host>* supports. This is primarily for use as a diagnostic tool, to help you determine whether the required NFS server programs are available to work with the NFS Option on the PC.

When you run RPCINFO, it displays the program numbers, version numbers, protocols, port numbers, and names of the remote programs registered on the selected host. The output of an RPCINFO command might look like this:

```
RPC Services for CIRCUS

  Program   Version  Protocol          Port              Service
  ------------------------------------------------------------
  100003          2       UDP          2049                nfs
  100021          1       TCP           743          nlockmgr
  100017          1       TCP          1041               rexd
  100001          1       UDP          1036             rstatd
  100004          2       UDP           977             ypserv
  100005          1       UDP           993             mountd
  150001          1       UDP          1002             pcnfsd
```

To use the NFS Option, the server must have a number of programs available; these are listed on page 5.

RSH

```
RSH <host> [-l <username>] <command>
```

The RSH command executes a single command on a specified host. RSH should be used with commands that are not interactive: that is, the command should not require further input.

To use RSH, you must have the Reflection Network Series module WRQHPSO.EXE loaded in memory; WRQHPSO.EXE is included with the Reflection Network Series software versions 2.10 and higher.

The RSH command is similar to REXEC, except that RSH does not require a password. A *<host>* must be specified. Also, you must be included in the "hosts" file on the host machine. The REXEC command, described on page 72, does not have this requirement.

`<host>`
: The name of the remote host on which the *<command>* will be executed.

`-l <username>`
: Your login user name on the remote host. If you specified an RSH user name in the NFS Option Setup program, a SET NETUSER=<username> statement was added to your AUTOEXEC.BAT file, and that user name is used for all RSH and REXEC commands; this parameter is not needed. (The user name is case sensitive.)

`<command>`
: The remote command to execute. The output from the command is sent to the PC screen. The command should not be interactive; that is, it should not require any additional information to complete.

U2D

```
U2D [-b | -l | -u] [-fz] <input_file> <output_file>
```

The U2D command lets you convert text files from the UNIX format to DOS format. This adds a carriage return before each linefeed character in the resulting DOS file. U2D is for use in converting text files only.

`-b`

Binary. Allows 8-bit character codes to be preserved in the output file. If this parameter is not specified, all 8-bit codes are converted to 7-bit codes.

`-l`

Lowercase. Converts all alphabetic characters in the input file to lowercase in the output file.

`-u`

Uppercase. Converts all alphabetic characters in the input file to uppercase in the output file.

`-f`

Forces U2D to leave any carriage return characters in the input file alone. Ordinarily, carriage return characters are removed in the conversion and linefeed characters are changed into carriage return/linefeed pairs. This parameter preserves carriage return characters in the output file.

`-z`

Add a DOS end-of-file marker (Ctrl-Z) to the end of the output file unless there is already one there.

`<input_file>`

The name of the UNIX file to perform the conversion on.

`<output_file>`

The name of the output file to create after the conversion. If an output file of the same name already exists, it is overwritten.

YPCAT

```
YPCAT [-kt] [-d <domainname>] <mname>
YPCAT -x
```


YPCAT prints out values in a Yellow Pages (YP) map specified by *<mname>*, which can be either a map name or a map nickname. The address of the Yellow Pages server is taken from the values for the keywords `NISDomainName` and `NISIPAddress` in your NET.CFG or PROTOCOL.INI file. These values are determined during Setup.

For example, to look at the network-wide group database "group.byname" (with the nickname group), type:

```
ypcat group
```

`-k`

Displays the key for each record in the database.

`-t`

Inhibits translation of *<mname>* to map name. For example, `ypcat -t group` fails because there is no map named group, whereas `ypcat group` is translated to `ypcat group.byname`.

`-d <domainname>`

Domain name. Specifies a domain other than the default domain, which is taken from the keywords `NISDomainName` and `NISIPAdddress` in your NET.CFG or PROTOCOL.INI file.

The `-d <domainname>` parameter must be in the form `<domain name>/<IP address>`. For example, `-d meg.edu/110.006.26.82`.

`-x`

Displays available map name aliases.

`<mname>`

The map name or nickname for the map.

YPMATCH

```
YPMATCH [-kt] [-d <domainname>] <key>[<key>] <mname>
YPMATCH -x
```

The YPMATCH command displays the value for a keyword in Yellow Pages. The displayed values are indexed by the specified key or keys contained in the Yellow Pages (YP) map *<mname>*, which can be either a map name or a map nickname.

The keys must be specified exactly; the search is case and length sensitive. No pattern matching is available. If a key is not matched, a diagnostic message is printed.

`-k`

Displays the key for each record in the database.

`-t`

Inhibits translation of *<mname>* to map name. For example, `ypmatch -t wheel group` fails because there is no map named group, whereas `ypmatch wheel group` is translated to `ypmatch wheel group.byname`.

`-d <domainname>`

Domain name. Specifies a domain other than the default domain, which is taken from the keywords `NISDomainName` and `NISIPAdddress` in your NET.CFG or PROTOCOL.INI file.

The `-d <domainname>` parameter must be in the form `<domain name>/<IP address>`. For example, `-d meg.edu/110.006.26.82`.

`<key> [<key>...]`

The key or keys to match in the specified Yellow Pages map.

`-x`

Displays available map name aliases.

`<mname>`

The map name or nickname for the map.

SECTION 3

Appendices

The appendices provide more information about the NFS Option. The first appendix explains how the NFS Option supports UNIX symbolic links. The second appendix describes some troubleshooting techniques and also lists the error messages for the NFS Option.

APPENDIX A

Symbolic Links

A symbolic link is a UNIX mechanism for gaining access to files or directories by multiple names. The NFS Option supports UNIX symbolic links for directories on the NFS server, as long as the subdirectories used in the path to the symbolic link are all valid DOS file specifications. In addition, the server directory to which the symbolic link points must be exported for your use.

For example, suppose you want to access a file in the following directory on an NFS server:

```
\USR\BIN\FILES
```

If `FILES` is a symbolic link to a directory on the server, it is followed.

On the other hand, if you want to access a file in this directory on the NFS server:

```
\USR\LOST+FOU.~AB\FILES
```

The symbolic link `FILES` is not followed, because `LOST+FOU.~AB` is not a valid DOS file name.

If a symbolic link for a server directory exists, you can mount the symbolic link instead of the destination directory to which it is linked. When you change to the mounted DOS drive letter, the symbolic link is followed to the correct server directory.

For example, suppose a UNIX host contains /U0/TST as a symbolic link to the file system /usr. If you mount your DOS E: drive letter to /U0/TST, the file system /usr is mounted, so that it is accessible as E:\U0\TST. If you receive an "Access Denied" message after attempting to change to that directory (CHDIR or CD), the symbolic link may be to a file instead of a directory.

Further, if a symbolic link points to a server directory that is not exported for your use, you cannot link to that directory; you will receive an "Invalid path or no access privileges to device" error when you try to perform the link. Even if you link to a directory that *is* exported for your use, you cannot change to a symbolically linked directory unless the other directory is also exported for your use. Attempting to change to the linked directory will result in an "Invalid directory" message.

APPENDIX B

Troubleshooting and Error Messages

The following are some problems you may encounter while using the NFS Option, and the action to take to resolve the problem:

- If you receive disk full errors when there is space available on the remote disk, there are a number of possible problems:
  - Use the "QUOTA" command to ensure that you have not exceeded your disk space quota on the server.
  - Have your system administrator use the DF command on the server to confirm that there is space available. Some servers return an incorrect value when their disks are close to full.
  - Any DOS errors encountered during a write operation are returned as "disk full." If the NFS Option has run out of memory, this error can be returned incorrectly. Try increasing the value for the `NFSWriteSize` keyword for the NFS Option in NET.CFG or PROTOCOL.INI.
- If your PC appears to "hang" while reading a file from the server, you should increase the value for the `NFSReadSize` keyword for the NFS Option in NET.CFG or PROTOCOL.INI.

  If the server or the network fails for any reason, your PC will seem to "hang." You can either wait for the problem to be resolved, or press Ctrl-Break a number of times to terminate the operation.
- If you can copy small files (less than 1000 bytes), but can't copy larger files to or from an NFS server, the buffer size of your network card may be smaller than the NFS Option's default read and write size of 4096 bytes.

  Try decreasing the value for the `NFSReadSize` and `NFSWriteSize` keywords in NET.CFG or PROTOCOL.INI. You might start by decreasing the value to its minimum of 512 bytes, then increasing it by 512 bytes at a time until copying no longer works. See page 17 for more information about these keywords.
- If you have trouble copying large groups of files to or from an NFS server while in Windows, you may need to increase the number of file buffers that the NFS Option allocates, using the /F parameter of WRQNFS.EXE. See page 13 for more information about this parameter.

- If you use Word for Windows and try to open a server file that is already in use by another user, you are asked if you want to make a copy of the file. If you answer "yes" but receive a message "Word cannot open the document," DOS SHARE.EXE has probably locked the maximum number of files it can at one time. To prevent this from happening, edit your AUTOEXEC.BAT or CONFIG.SYS file and increase the number of locks for SHARE.EXE. The default number of locks is *20*. To increase the number of locks to 30, for example, you would enter the line `<path> SHARE.EXE /1:30` in your AUTOEXEC.BAT file.
- If you receive an "Access denied" message when trying to link a remote printer, make sure that the spool directory on the NFS server is included in the /etc/exports list. In part, a link to a remote printer is actually a link to a remote spool directory.
- If you receive the message "Out of Paper reading/writing device <device>," increase the value for the `NFSReadSize` keyword for the NFS Option in NET.CFG or PROTOCOL.INI.

Error Messages

The following are NFS Option error messages, and the likely cause of the error. The action to take to resolve the problem is also given. Error messages are listed alphabetically.

<name> is an unknown host (<reason>)

EXPORTS, NET LINK, and REMLOCKS error. There is either a syntax error in your command, or the host name specified could not be resolved to an Internet address. The specific reason is given with the error message.

If the name resolution is being handled locally on the PC with a HOSTS file, make sure that the HOSTS file exists and has not somehow become corrupted. The NFS Option looks for the HOSTS file specified in this line in your NET.CFG or PROTOCOL.INI file (in PROTOCOL.INI, an equal sign separates the keyword from the path):

```
HostsPath <path>
```

The default *<path>* is C:\WRQNET. The HOSTS file entries use the following convention:

```
<IP address>  <hostname>  <alias1> <alias2> ....
```

For example:

```
250.113.45.7    circus    CIRCUS
```

If you are using DNS services to resolve a host name to an address, make sure that the keywords `DNSServerAddr` and `PCDNSHostName` are set in NET.CFG or PROTOCOL.INI.

Access denied

NET LINK error. An attempt to link the remote file system was refused because the username specified did not have sufficient privileges on that host, or the path is not included in the /etc/exports file. Some remote host systems incorrectly return this message when they should return an "Invalid remote device" message (see page 90).

Authorization error

NET LINK error. The username or password supplied is not valid on the remote host. Make sure that the case is correct and that you have either executed the NET LOGIN command or specified the username or password in the NET LINK command.

Bad arguments, internal error

This message is returned from the NIS (Yellow Pages) server on the remote host and indicates an incorrect parameter was received by the NIS server from either YPCAT or YPMATCH.

Bad database file

YPCAT or YPMATCH error. This message is returned from the NIS (Yellow Pages) server on the remote host and indicates a problem with the NIS database file on the NIS server.

Bad operand, internal error

YPCAT or YPMATCH error. This message is returned from the NIS (Yellow Pages) server on the remote host and indicates an internal error in response to the YPCAT or YPMATCH programs.

Block limit reached on <drive>
NET LINK error. This message indicates that your disk quota on the remote host has been exceeded. Remove some files from the specified host path if you need to create any new files there.

Cannot Disconnect
This drive was not connected by File Manager
The drive you attempted to disconnect was originally linked from DOS, and can only be unlinked from DOS.

Cannot Unlink <drive>
This drive was linked in a different environment
The drive you attempted to unlink was originally linked from DOS or Windows, and cannot be unlinked in a DOS box from Windows.

Can't cat <mapname>. Reason:
YPCAT error. Indicates that the NIS (Yellow Pages) server was unable to complete the YPCAT command for the specified reason. Make sure that the server is running.

Can't match key <keyname> in map <mapname>. Reason:
YPMATCH error. Indicates that the NIS (Yellow Pages) server was unable to complete the YPMATCH command for the specified reason. Make sure that the server is running.

Device <name> not found
NET PRTSETUP error. The device *<name>* has not been found in the PC's redirection table. Check the spelling, or type `NET USE` to list redirected devices.

This message also appears if the specified device is not valid in the NET PRTSETUP command. These commands can only be issued for linked devices.

<Device> not a printer
NET PRTSETUP error. Indicates that you have used the NET PRTSETUP command on a linked device that is not a printer.

Device/Drive not linked

NET UNLINK error. Indicates that you have attempted to unlink a device that was not previously linked by the NFS Option. Type `NET USE` to display a list of currently linked devices.

Device <name> not linked

Indicates either that the device could not be linked with a NET LINK command, or the device is not currently linked and therefore could not be unlinked with a NET UNLINK command. Type `NET USE` to display a list of currently linked devices. If you are trying to link the device, check the command syntax, and check that the file system to which you are trying to link is valid.

Disk full

If there is space available on the remote disk, and you see "Disk full..." messages, the problem may be that:

- You have exceeded your disk space quota on the server.

  Use the QUOTA command to check the server disk space. Or run the DF command on the remote computer to confirm the available space. Some systems return incorrect values when the disk is close to being full.

- You don't have enough buffer space.

  Try increasing the value for the `NFSReadSize` keyword for the NFS Option in NET.CFG or PROTOCOL.INI, or reducing the transfer size. If the NFS Option runs out of memory, an error is returned to DOS. Unfortunately, DOS understands all write errors to mean that the disk is full.

Error storing printer setup

NET PRTSETUP error. Indicates that the NET PRTSETUP command has failed to create a setup file because of insufficient buffer size. Increase the value for the `NFSReadSize` keyword for the NFS Option in NET.CFG or PROTOCOL.INI.

Extended Error <number>

The "Extended Error" messages are DOS error codes returned to the NFS Option. These errors can occur when an operation could not be completed because the file, drive, or path does not exist, the network could not be accessed, or the user does not have the necessary permissions to complete the operation. For example, extended error 65 can occur if you try to copy a file from your PC to an NFS file system on which you do not have write permission.

File count limit reached on <drive>

Your maximum number of files on the remote system has been exceeded. You must remove some files from the specified host file system if you need to create any new files.

<filename>: Not owner

This message is returned when you specify files with the CHMOD command for which you are not the owner.

<filename>: Permission denied

This message is returned when you have specified files with the CHMOD command that you do not have permission for.

<filename> or <directory>: No such file or directory

This message is returned when you specify files or a directory with the CHMOD command that do not exist. Check the spelling of the file or directory name(s) or add a full directory specification to the file or directory name.

Incompatible options -l -u

This message is returned from D2U or U2D if you have specified both the `-l` (lowercase) and `-u` (uppercase) parameters together.

Incorrect Password

This message can indicate either an incorrect user name or password when trying to link a file system in Windows. Make sure that you have access privileges on the file system to which you're trying to link, and that you're logged in to the NFS server with the correct user name and password.

Input <filename> not found

The specified <*filename*> was not found. Check the spelling of the file or directory name, or add a full directory specification to the file or directory name.

Invalid device <device>

This message is returned when a network-specific command is attempted on an invalid device. Check the <*device*> name.

Invalid directory: <directory name>

The directory you specified with the LS command was not found.

Invalid local device

NET LINK, NET UNLINK, EXPORTS error. The local device name that you have specified is not a valid DOS device. Check the device name you are using. Typical DOS device names are PRN, LPT1, LPT2, LPT3, COM1, COM2, COM3, and COM4, and disk drive letters up to the drive letter specified in the `LASTDRIVE=` entry in your CONFIG.SYS file. If you have a local hard disk drive in your PC, you should not use drive C: in any attempts to link a remote file system.

Invalid mode (<mode>)

This message is returned from the CHMOD command if you have specified an invalid mode; check the syntax of the command and confirm that the mode is valid.

Invalid numerical mode: <mode> (must be octal)

The mode you specified for the CHMOD command is not a valid octal numerical mode in the range 000 to 777. See page 55 for information about mode values.

Invalid output <filename>

This message is returned from the D2U and U2D commands if the output file name is invalid, if write access is denied, or if the local drive has the read-only attribute set.

Invalid permission <device>

This message is returned from the CHMOD command if you have specified an invalid permission character.

Invalid protection <number>

This message indicates that the protection level specified in the NET PROT command is not a valid octal number in the range 000 to 777.

Invalid remote device

This message indicates that the file system (the directory structure) you are attempting to link is not included in the EXPORTS file on the remote host. Use the EXPORTS command (described on page 60) to see which file systems are available for mounting on a given host.

This message can also indicate the host name or file system was incorrectly entered. A host name is specified as `\\<host>\`, and a file system is typically specified as `/<filesystem>`. For example, `\\wrq\/u0/rns`. If you are trying to link to a printer, the format is `\\<hostname>\<prtname>`, where *<prtname>* is a printer name included in the /etc/printcap file. (Also see "No response from remote host" on page 91.)

Some systems require that the Internet address of each PC be included in the host tables even when the file system has been made available to all users.

Some non-UNIX host systems require a mapping between the host name and some local identification. If no host name is specified on the command line, the NFS Option sends the hexadecimal representation of the PC's Internet address. For example, if the PC's address is 130.113.0.15, the host name that is sent is 8271000F.

Invalid symbolic mode (<character>); valid modes are r, w, s, t, and x

This message is returned from the CHMOD command if you have included a character other than r, w, s, t, or x as the *permission* parameter of a symbolic mode.

Invalid User Name or Password

This message occurs when a NET LOGIN command fails because the user name or password is invalid. Ensure that the user name and password are correct. Since most NFS servers are UNIX hosts, the user name and password are typically case sensitive, so you should check for the correct case of the user name and password as well.

Invalid who or operator (<character>)
Valid who types are u, g, o, and a.
Valid operator types are +, -, and =.
This message is returned from the CHMOD command if you have included an invalid character for either the *who* or *op* parameters. Valid *who* types are u (user), g (group), o (others), and a (all). Valid *op* types are + (to add permission), - (to remove permission), or = (to assign specific permission).

Local device/drive unavailable
NET LINK error. Indicates that the local device you tried to link is already linked. Type `NET USE` to display a list of linked devices.

Memory allocation error
This message indicates that the LS command was unable to sort the directory lists because of insufficient memory in DOS. Free up some of your DOS conventional memeory; see "Memory Management" on page 20.

mountd not running
This message indicates that the rpc.mountd dæmon is not running on the remote host from which you requested the exports list. Start rpc.mountd on the remote server.

No response from remote host
This message indicates one of two possible problems:

- If this message is returned immediately, the NFS Option is unable to locate either PCNFSD or rpc.mountd (the remote host mount dæmon) on the remote host. Use the RPCINFO command to determine which remote procedure calls are available.
- A delay before this message is returned indicates that the PC is unable to establish communication with the host system. The host system may be down or unavailable because of network problems.

No room for redirection

Indicates that you have linked the maximum number of remote devices; the valid range is 2–25 and the default is 6. Either unlink an unwanted device, or increase the value of the `NumNFSRedirects` keyword in NET.CFG or PROTOCOL.INI and restart the NFS Option. See page 18 for more information on this keyword.

No room in redirection table for request

This message indicates that the NFS Option was unable to allocate a spare drive entry for its own internal use. Increase the value of the `NumNFSRedirects` keyword in NET.CFG or PROTOCOL.INI and restart the NFS Option. See page 18 for more information on this keyword.

No such key in server's domain

YPCAT or YPMATCH error. This message is returned from the NIS (Yellow Pages) server on the remote host and indicates that the requested key does not exist in the NIS database.

No such domain

The domain name specified in the YPCAT or YPMATCH commands is not the domain that the remote host NIS server serves. For information about domain names, see page 77.

No such map in server's domain

The map database specified does not exist on the remote host NIS server.

Not network device <driver/port>

This message is returned when a network-specific command is attempted on a local, non-networked device.

Number of disks must be between 2 and 25 inclusive

Both disk drives and physical devices are considered links; the valid range is 2–25, and the default is 6. Use the `NumNFSRedirects` keyword in NET.CFG or PROTOCOL.INI to change your setting and restart the NFS Option. See page 18 for more information on this keyword.

Out of buffer memory
You have run out of buffer space. Increase the value for the `NFSReadSize` keyword for the NFS Option in NET.CFG or PROTOCOL.INI.

Over disk quota on <filesystem>, remove <bytes>K
Your disk space allotment on the remote system has been exceeded. You must remove some files from the specified host file system if you want to create any new files on it.

Over disk quota on <filesystem>, remove <bytes>K within <time limit>
Your soft disk space allotment on the remote system has been exceeded. Remove some files from *<filesystem>* within *<time limit>* if you want to create any new files on it.

Over disk quota on <filesystem>, time limit has expired, remove <bytes>K
Your disk space allotment on the remote host has been exceeded. You must remove some files from *<filesystem>* if you want to create any new files on it.

Over file quota on <filesystem>, remove <bytes>K
Your maximum number of files on the remote host has been exceeded. Remove some files from the specified host file system if you need to create any new files on it.

Over file quota on <filesystem>, remove <bytes>K within <time limit>
Your maximum number of files on the remote host has been exceeded. Remove some files from the specified host file system if you need to create any new files on it.

Over file quota on <filesystem>, time limit has expired, remove <bytes>K
Your maximum number of files on the remote host has been exceeded. Remove some files from the specified host file system if you need to create any new files on it.

Permission not specified
This message is returned from the CHMOD command if you have not included a valid permission character (R, W, X, S, or T).

Print-out pending, printer not unlinked

NET UNLINK command. This message indicates that you have attempted to unlink a remote printer device either while data is still in transit, or while you are printing from a DOS application that uses the INT 17 method of printing. INT 17 printing requires a 30-second delay after the DOS application sends its last character to complete the queue operation. Wait 30 seconds and then retry the NET UNLINK command.

Read error reading drive <port>

The server is no longer responding to the PC. Check the remote server. If the server is only temporarily down, the operation may succeed if you try again later.

Read I/O size must be between 512 and 8192 bytes inclusive

You have specified an invalid read size with the `NFSReadSize` keyword (described on page 17) or the /r:<read_size> parameter of the NET LINK command (see page 66).

Remote host unavailable

This message can indicate a number of different problems. If you have been using the NFS Option successfully, this message indicates that the NFS dæmon is no longer running on the remote host, or the remote host has crashed or is unreachable because of a network problem. Consult your system manager.

RPC access denied

This message is returned from any command that uses RPC calls (such as EXPORTS and NET) and where the remote host does not recognize your credentials as a valid system. Make sure that your PC's Internet address or host name is known to the remote host.

Server error

This message is returned from the NIS (Yellow Pages) server on the remote host and indicates an internal error in response to the YPCAT or YPMATCH programs.

Server version mismatch

This message is returned from the NIS (Yellow Pages) server on the remote host and indicates a version mismatch between the NIS server and the YPCAT or YPMATCH programs.

Setup file <filename> not found
This message indicates that the printer setup file specified in the NET PRTSETUP command was not found. Check the spelling of the setup file name or add a directory specification to it.

The host <name> exists, but does not support NFS
The host from which you are trying to get an exports list supports remote procedure calls, but does not have an NFS server program available. You can use the RPCINFO command to determine whether NFS is available on a host.

The host <name> exists, but does not support RPC (Remote Procedure Calls)
The host from which you are trying to get an exports list exists, but does not support any of the remote procedure calls required to use NFS. You can use the RPCINFO command to determine which, if any, RPCs the host supports.

The host <name> exists, but LOCKD is not running
The host on which you are trying to use REMLOCKS exists, but does not have an rpc.lockd dæmon running. Use the RPCINFO command to determine which RPCs the host supports.

Too many parameters
This message is returned from D2U and U2D if you have specified too many parameters on the command line. The syntax for D2U is described on page 58; the syntax for U2D is shown on page 75.

Unable to get export list
This message is returned by the EXPORTS command if it is unable to retrieve the exports list from the specified host.

Reboot your PC. Make sure that you load the NFS Option program (WRQNFS.EXE) last.

Unknown error number <number>
This message indicates that DOS has returned an unknown error number to the NET command. Make sure that the NFS Option is loaded and that no other memory-resident programs have been loaded after it.

Unknown group: <name>
YPCAT or YPMATCH command. The specified group name was not found in the /etc/group file on the remote host.

Unknown host
NET LINK or EXPORTS error. There is either a syntax error in your command, or the host name cannot be resolved to an Internet address.

If the name resolution is being handled locally on the PC with a HOSTS file, make sure that the HOSTS file exists and has not somehow become corrupted. The NFS Option looks for the HOSTS file specified in this line in your NET.CFG or PROTOCOL.INI file (in PROTOCOL.INI, an equal sign separates the keyword from the path):

```
HostsPath <path>
```

The default *<path>* is C:\WRQNET. The HOSTS file entries use the following convention:

```
<IP address>  <hostname>  <alias1> <alias2> ....
```

For example:

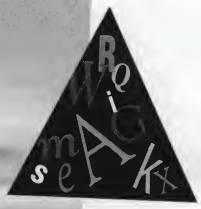
```
250.113.45.7      circus      CIRCUS
```

If you are using DNS services to resolve a host name to an address, make sure that the keywords `DNSServerAddr` and `PCDNSHostName` are set in NET.CFG or PROTOCOL.INI.

Write error writing drive <port>
The server is no longer responding to the PC. Check the remote server. If the server is only temporarily down, the operation may succeed if you try again later.

Write I/O size must be between 512 and 8192 bytes inclusive
You have specified an invalid write size with the NET LINK command; see page 66.

u are not a member of group <group name>
u are not a member of *<group name>*. Check the spelling of the group name and e sure that your user name is listed under the group in the file /etc/group on the ote host.



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